The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879

NATHAN C. ROCKWOOD, Advisory Editor

GEORGE P. MILLER, Manager
E. M. GIBSON, Assistant, Manager
CHARLES A. BRESKIN, Adv. Mgr.
CLINTON S. DARLING, Promotional Manager.
H. E. HOPKINS } Associate
GEORGE M. EARNSHAW } Editors
JOSEPH K. COSTELLO, Central Rep.
ALAN B. SANGER, Eastern Rep.

SUBSCRIPTION—Two dollars a year to United States and Possessions. Three dollars a year to Canada and foreign countries. Twenty-five cents for single copies.

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Published Every Other Saturday by

Tradepress Publishing Corporation

542 South Dearborn Street, Chicago

MEMBER A. B. C. MEMBER A. B. P.

W. D. CALLENDER, President
N. C. ROCKWOOD, Vice-President
GEO. P. MILLER, Treasurer
C. O. NELSON, Secretary

Volume 25 September 23, 1922 Number 19

CONTENTS

"The Light of Other Men's Experience"

This quotation is attributed to John Wanamaker, whose success as a business man has been equaled by few:

"Every man starting out in business will have to go over a hard road and find out its turnings for himself. But he need not go over his road in the dark if he can take with him the light of other men's experience."

"The light of other men's experience"—where is it to be gained? Travel, conventions, and other methods of gaining personal contact are possible, but limited in value because of the time, expense, and inconvenience which accompany them.

Only one method exists which is practicable for week after week use in gathering "the light of other men's experience," and that lies in the regular reading of the business journal of the industry in which a man is engaged. Regularly it comes to his desk, and when it is well planned and carefully edited in the interests of the reader there is no more dependable source from which to absorb the benefit of others' experience and learn from the lessons they have learned and are constantly learning.

* * *

In the Interests of the Reader

When is the business journal of an industry well plannd and carefully edited in the interests of the reader? When those responsible for it are men of ability and integrity, who subscribe to the commonly accepted principles of business ethics, and who in their work constantly keep in mind the idea "The reader first."

It is this idea of reader service to which ROCK PRODUCTS devotes special attention, using every device to obtain the latest news, to verify every report, to reproduce the best and most modern opinion and design on technical and operating questions. But it does more than this. Its representatives are constantly in the field in order to observe conditions as they are and to reflect the trends in the industries ROCK PRODUCTS represents. One editor alone in the past eight months has traveled 12,000 miles in carrying on this work, and other members of the staff in their search for editorial material have covered nearly an equal distance.

* * *

Preparing a Single Issue

Take the issue you have in your hands, for example. Five articles describing plant operations in four of the rock products industries represent trips of four representatives aggregating more than 3000 miles of travel in widely separated sections of the country. Each issue is similar in the thoroughness of its preparation. One who reads a magazine which devotes its efforts so painstakingly to the interests of the reader need do little else in order to constantly add to his own knowledge that "light of other men's experience" which Mr. Wanamaker has emphasized as so important.

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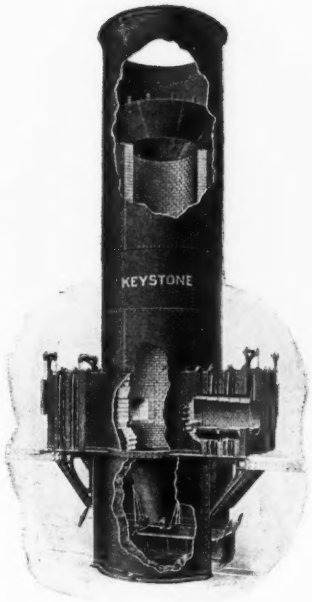

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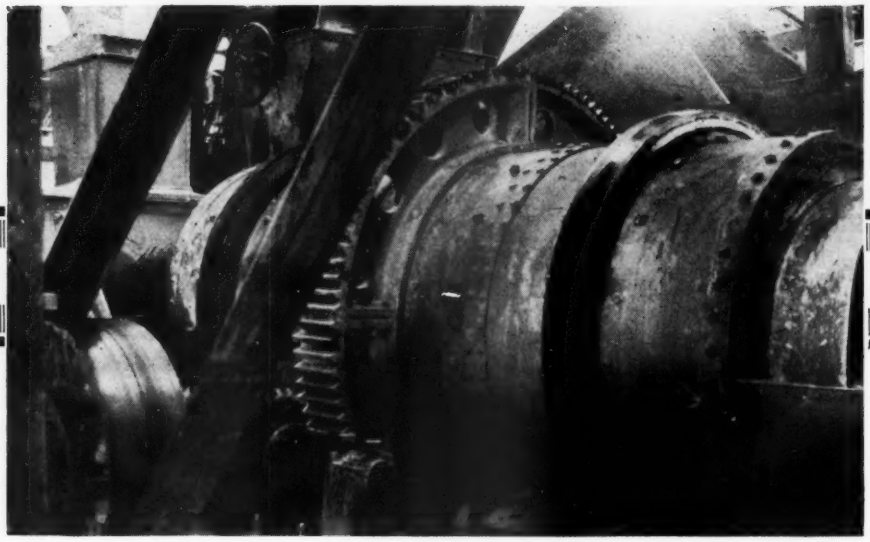

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At the Belt Line Brick Plant

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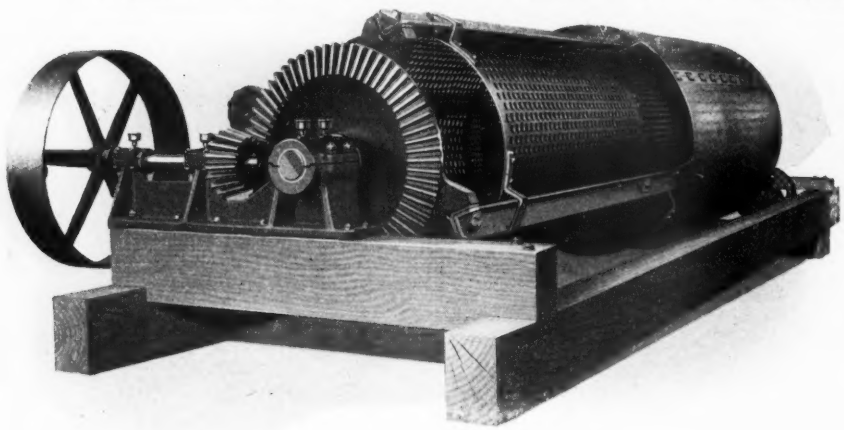
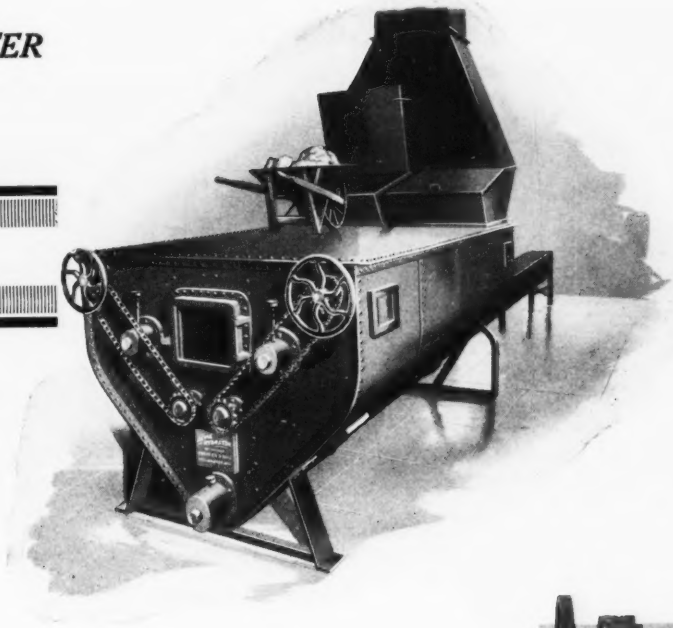


The Mill is 48 in. by 108 in., has cast steel liners and a heavy perforated bar retaining head at the discharge end. It has a kneading as well as a mixing action, and makes possible a high grade product. This machine has a capacity of 100,000 brick per day, and is suitable for pulverizing all materials.

The TOEPFER Hydrating Machine



Another important machine in the plant is the Toepfer Lime Hydrator. This machine is very simple in construction and economical in operation. It is batch controlled, but possesses all the advantages of a continuous hydrator, as the finished product emerges from the machine in a continuous stream. It is automatic in operation, and can be run 24 hours every day without stops or delays. It is absolutely dustless in operation and is strong and durable, with very little wear on working parts.

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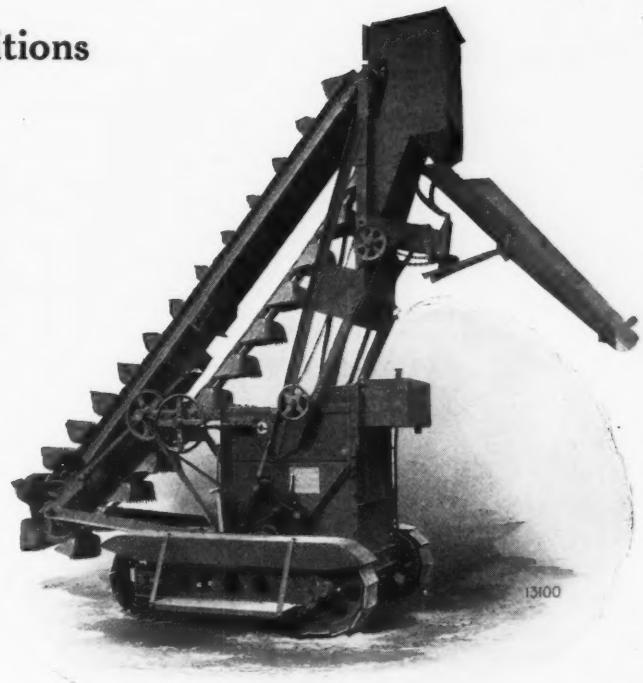

Tanktred Mounting makes traveling easy over soft, rough or uneven ground—without planking.

The TANKTRED Loader combines special features of design and construction which enable it to readily dig into hard or compact material, either with a straight feed into the pile or when making a diagonal cut, and without requiring the aid of hand shovelers or mechanical devices to bring material to the buckets.

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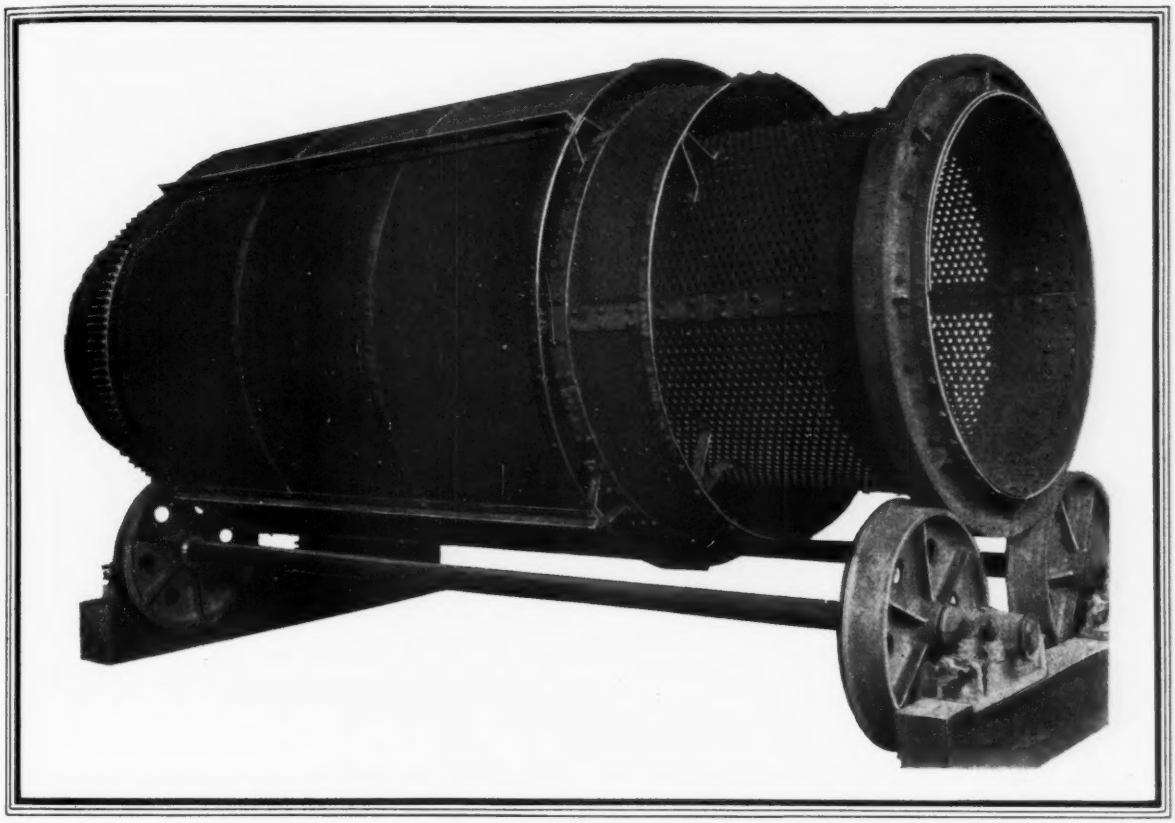

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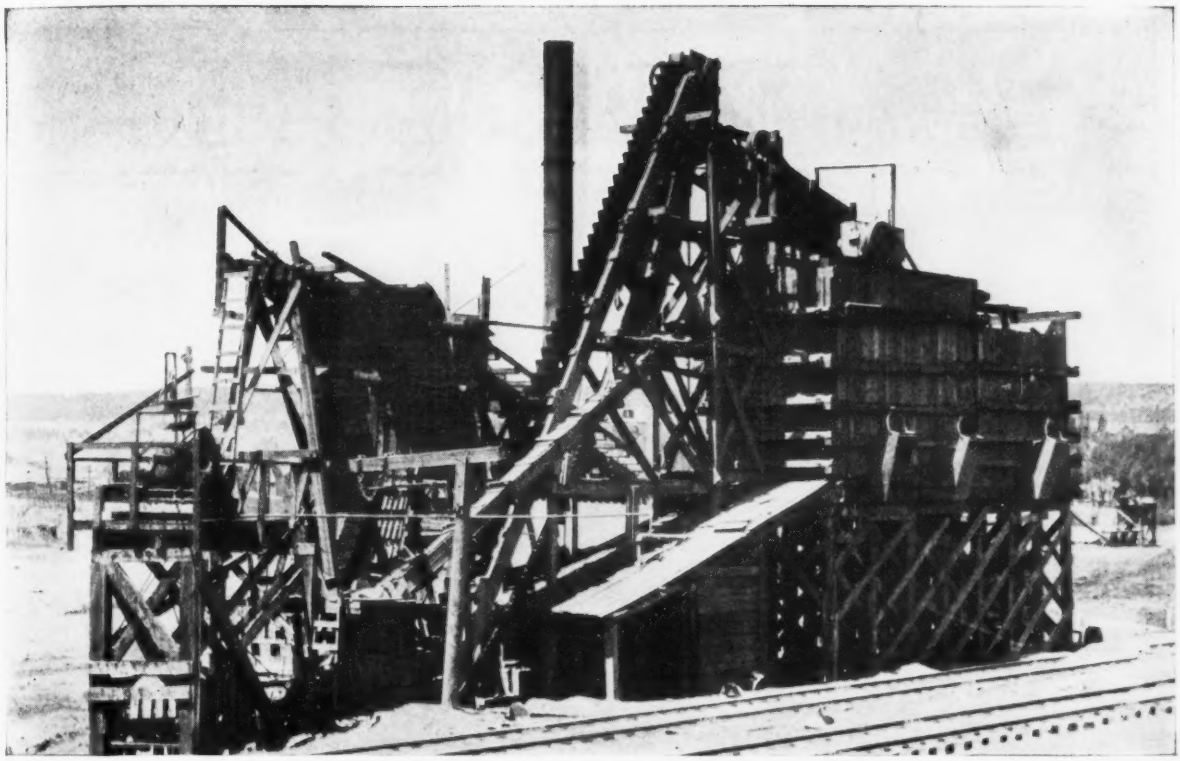

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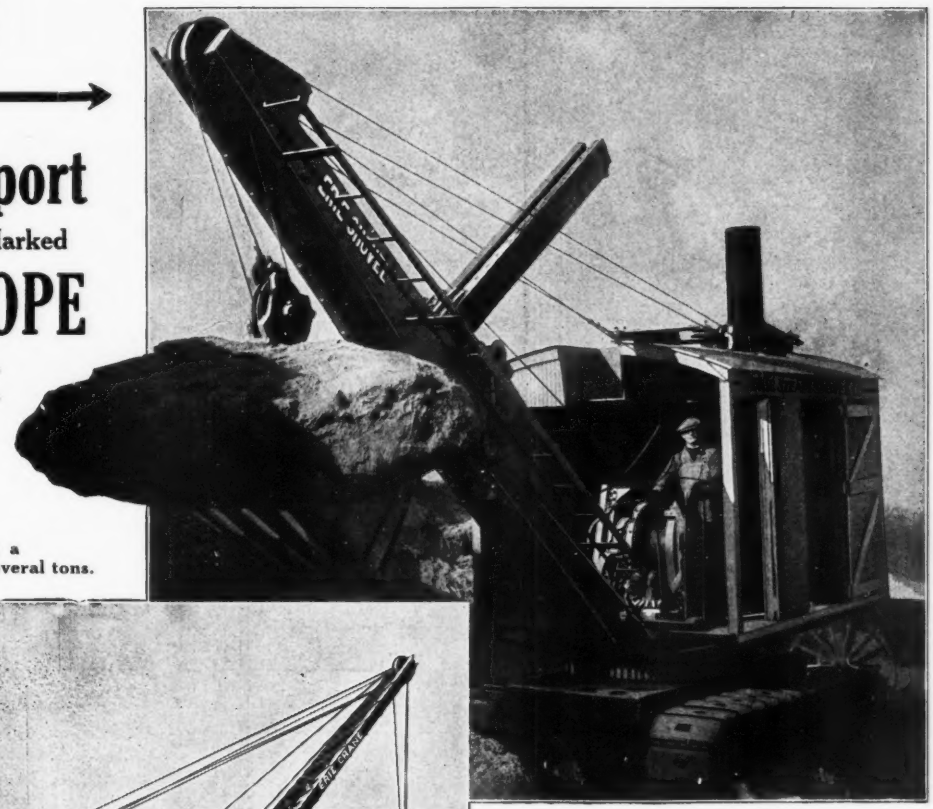
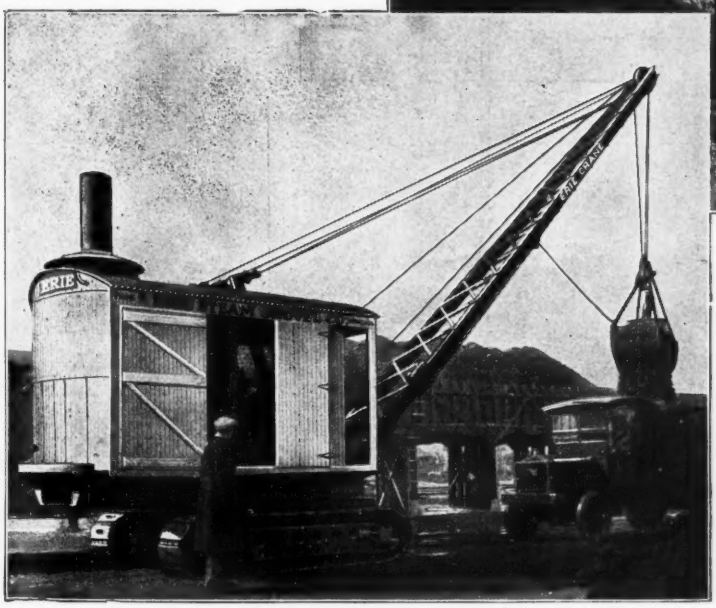


Here's an Erie Type B 20-ton shovel handling a chunk of frost weighing several tons.



The Erie Co. writes us: "The fact that Williamsport Wire Rope is giving excellent satisfaction on cranes of such unusual speed might prove a favorable indication of your rope's good qualities. Rope service on Erie Cranes is especially severe because of the speed at which they operate, for in one test with a ¾-cu. yd. clamshell bucket it loaded 140 cu. yds. of sand in one hour for several hours' running using a 20-ton Erie Crane."

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Rock Products

Volume XXV | Chicago, September 23, 1922 | Number 19

12 Years' Test Proves Its Worth

One of the country's largest stone plants has operated without change of method

A PLANT which has stood the test of time—that briefly characterizes the large stone crushing operation of the Tomkins Cove Stone Co., located on the west bank of the Hudson river, 35 miles north of New York City.

The present plant, which was put in operation in the spring of 1911, replaced two plants which had been operating for 50 years or more. The new plant more than doubled the capacity of the old two combined. During the past 12 years the same plant has been turning out regularly its quota of stone and the few changes which have been made testify to the excellence of the original design. The only change of importance in the plant since its original construction is the addition of more screens. This makes it possible to produce seven sizes instead of the three which the plant originally turned out.

For several years this was the largest plant producing crushed stone in this country. The layout of the plant fits the natural conditions of the ground, and while its design is not one that would be copied as a whole today, there are many valuable ideas, the worth of which has been proved over a period of years, to be gained from a study of the plant's operating methods.

The stone is shipped almost wholly by barge to the large markets available in and near New York City. Freight rates and car supply have been small factors in the shipping of the product, and perhaps for this reason the company has been able to create and maintain an unusually steady demand for its product.

> ***"EXCEPT FOR A FEW minor changes, the plant is the same now as when it was built. During the 11 or 12 years that the plant has been running we have had in mind always two main purposes: first, to keep the plant in such shape that it runs with the minimum of delay; and secondly, to keep the quarries and trackage in such shape that there is always stone at the crusher waiting to be crushed."—Sterling Tomkins, president, the Tomkins Cove Stone Co.***

The normal output is around 4000 yd. per eight-hour day, though as much as 6000 yd. has been produced in a 10-hr. day. This is accomplished with a force of around 200 men all told, including the barge captains. With such a large operation, many things can occur to hold up the smooth working of the plant and it is because the plant manager and superintendent have been largely successful in anticipating such possible break-downs that the plant operation has remained very steady with but few interruptions of any importance.

The stone comes from two levels of the quarry. The lower one has a face of about 77 ft. high, while the upper one is of varying height and runs as high as 125 ft. in some places. The top of this upper level is stripped by means of a Marion shovel, and 5-ton Packard trucks haul the stripping off to be dumped. Four Clipper, one Keystone, and one Star drill sink holes to the full depth of the face. Holes are spaced about 15 ft. apart and set back from 27 to 30 ft. from the line of the previous shot.

The upper quarry floor is level with the dumping tracks of the crusher house at the left. Below the crushing plant is the power house, and in the foreground is the sump from which condenser water is pumped

Holes are drilled about 3 ft. below grade and sprung. From 20 to 40 holes are fired at a time.

Three Bucyrus shovels are used in

From the lower level, stone is hauled past the power plant to the Y, from which it is pushed up the grade at the right to the crusher house

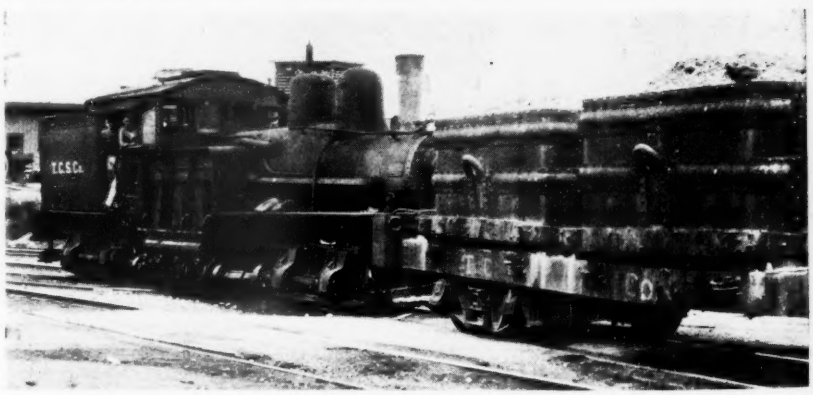
Twelve years ago the crushing plant was built into this cut in the quarry face. The frames of the power plant structures are shown

loading the stone into the skips, one in the old lower quarry and two in the upper one. Practically no pop blasting is necessary because the shovels, skips, and crusher can handle stone up to 10 tons in weight.

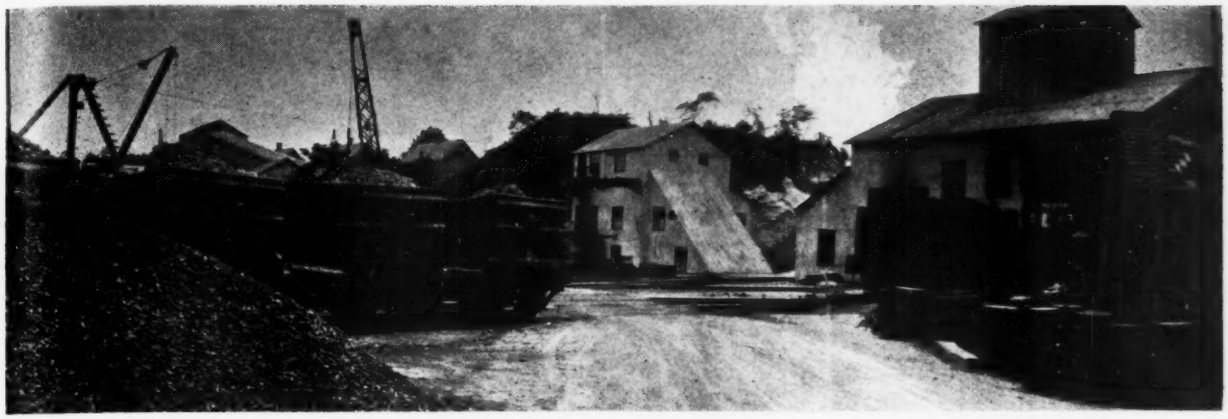
Transportation from quarry to crushing plant is by means of standard-gage track cars with specially designed steel skips, and steam locomotives—three American and three Shay. From the lower quarry, loaded cars must be hauled nearly a quarter mile away from the plant to a Y switch, then pushed up the hill to the crushing plant, where they are dumped. The upper quarry floor is on the level with the dumping tracks at the crushing house.

The three crushers are of the Edison roll type. The crushing plant itself is set in a cut in the quarry face made especially to receive the crushers and the construction supporting them. The opening of the crushing plant is about 50 ft. wide and 64 ft. deep at the quarry face, with a level floor at the bottom for a distance of 50 or 60 ft. back from the face, at which point the slope wall parallels the pan conveyor to the ground surface. A layer of concrete 10 ft. thick was placed over the faces of this opening and the structure of steel cross beams which supports the crusher rolls and other necessary machinery were embedded in these concrete side walls. By setting the crushing apparatus in this opening, it is possible to dump stone from the level of the upper quarry floor without elevating it so that it goes direct to the big initial crusher, then through the two following crushers and into a bucket elevator which elevates the crushed material to the preliminary screens. A steel skeleton building with corrugated iron covering protects the machinery of the crushing plant.

On top of the upper level quarry this shovel strips clean, as shown



Special steel skips which slide easily on and off the car for dumping are used for hauling the stone

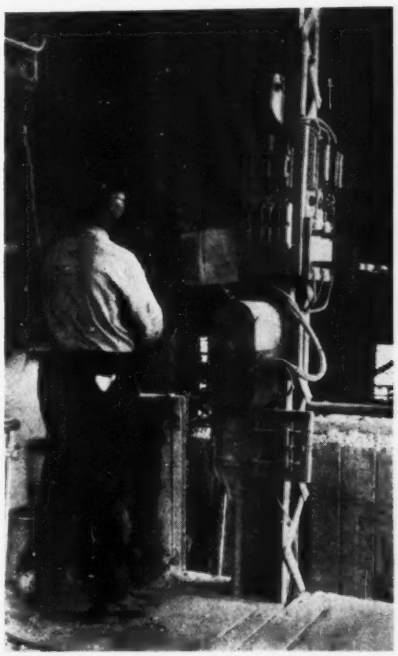


From the crushers at the right stone goes to the preliminary screens in the center, then by belt nearly 400 ft. to the main building just visible over the cars at the left

The crushers consist of three sets of Edison rolls. The initial set comprises two solid rolls, 6 ft. in diameter and 7 ft. long, each weighing 48 tons and revolving at 180 r.p.m. The rolls of this set are placed with a 7-in. opening between them, and will take stone as large as the skips will hold—up to 10 tons—and reduce it in one operation to 7-in. stone.

The unloading of the skips is accomplished by means of an electric hoist which slides the skip off the car onto the dumping table and until all of the stone has been discharged. The skip is then lowered and by means of a counter weight the same hoist pulls it back on the car. A 45-hp. motor operates the hoist.

The initial or giant rolls will crush at the rate of 2,000 tons an hour, and since there is an interval between loads of stone to be crushed, a 30-ton hopper under the initial rolls serves to feed the stone at a uniform rate to the next set of rolls which are 4 ft. in diameter and 4 ft. long, set at a distance of 4 in. apart.

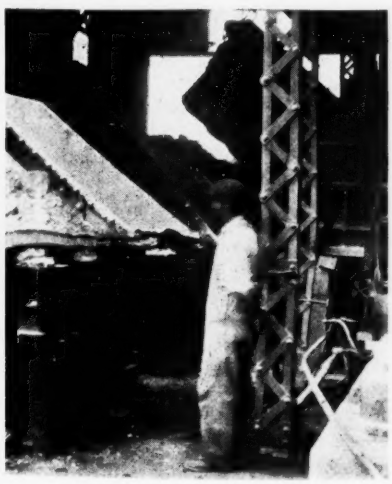


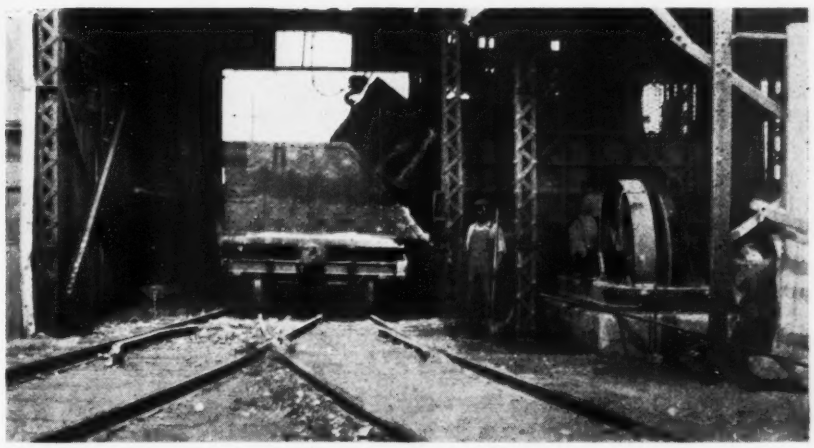
This counter at the dumping station records the number of skips dumped. The number commonly runs over 400 a day

A feed roll between the first and second crushers aids the uniform supply of stone which the hopper furnishes. After passing through this second set of rolls, the stone drops to the third set of rolls, 4 ft. in diameter and 3 ft. long. The opening between these rolls is varied according to the size of stone desired, it being possible to reduce the entire product of the plant to 1-in. size and smaller without materially affecting the capacity. These two smaller sets of rolls operate at 250 r.p.m. and have a capacity of 1000 tons an hour.

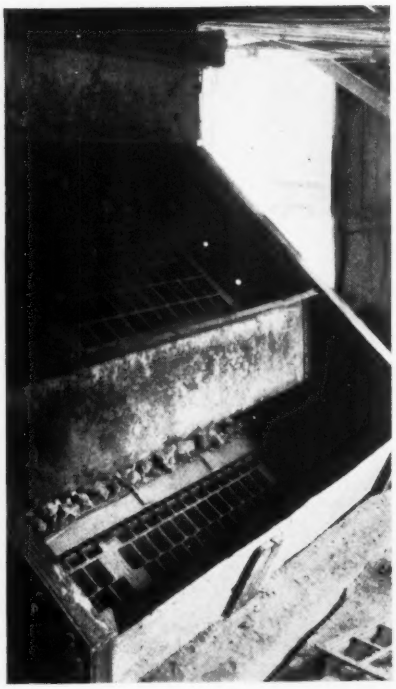
All of these rolls are driven by belts from the main line shaft from an engine house situated below the upper quarry floor level and about 20 ft. above the lower floor level. A gravity oiling system furnishes the lubrication for the rolls and accompanying machinery, a large supply of oil being fed through the bearings and drained into a tank at the bottom of the crusher plant, from which it is filtered and pumped back to the tank above the rolls.

Fifty feet or so from the crushing plant is the initial screen house. A large bucket elevator consisting of 118 steel pans, each 72 in. wide, running on 180-ft. centers, carries the crushed stone from





Skips are easily dumped by a hoist, as shown above and at the right



Preliminary screening is accomplished on these stationary banks

the smallest rolls to the initial screens where all stone over 2½ in. is rejected and returned by a belt and chute to the smallest rolls for recrushing. The screens are stationary ones, set at an angle with the stone falling over them by gravity. Ordinarily, the square openings on these preliminary screens are 2½ in., but if there is an increased demand for smaller material, 2-in., or even 1½-in. screess can be placed here in order to reject more material and have this material recrushed until it furnishes the larger quantity of the smaller sizes. A 42-in. belt, which is 371 ft. 6 in. from center to center, elevates the material from this preliminary screen to the top of the final screening house which is on somewhat higher ground than the crushisg plant and preliminary screening plant.

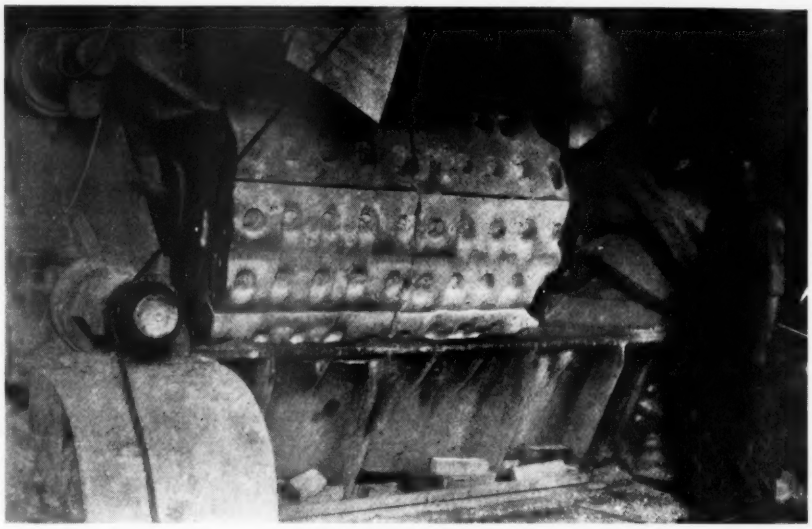
The main screen serves to separate all this stone passing the preliminary screens into three groups, which are later further separated into a total of seven sizes. This main screen is about 16 ft. square and is of structural steel skeleton construction. The stone which enters at the top is tumbled over a series of steps on two opposite sides of the screen as shown in the diagram, and through open spaces at the rear of these steps on to horizontal solid plates, then over a bank of three inclined stationary screens with 1 in. openings which separate the stone between 1 and 2½ in. The stone below 1 in. drops on the inclined screens with ⅜-in. openings, which separate the stone from ⅜ to 1 in. sizes. Once the angle of inclination of these screens was determined so that they operate properly, the screens have continued to work very well. There are no movable parts to wear out or require attention. Since the stone does not meet the screen direct but slides on the screens from solid plates, the wear on a screen is not excessive.

Until a few years ago, all stone from the plant was marketed in these three sizes, but the company has found that a finer separation of sizes was necessary. Therefore, additional gravity screens have been put in to separate the first group into three sizes, 2½, 1½ and 1 in., respectively, the second group into ¾ and ½ in. and the third group into ⅜ and ¼ in. Screenings below ¼ in. are carried by belt to cars and hauled off and dumped for lack of market for this size of material.

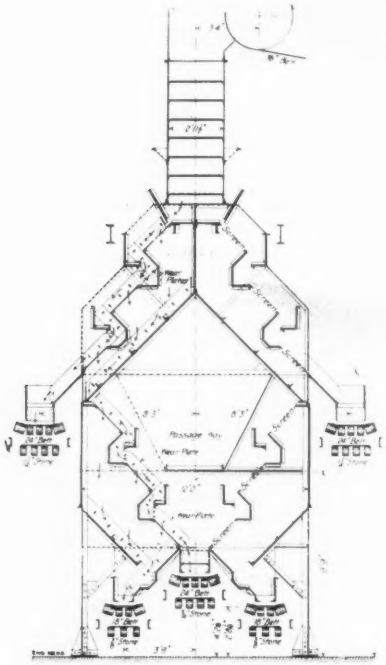
Five belts from the main screen run at right angles to the direction of the belt from the preliminary to main screen and carry the three groups of sizes to the end of the conveyor gallery over the bins. Two of these conveyors, at a higher level than the others and at either side of the screen house, carry the 1 to 2½ in. material, and by means of a short cross conveyor both discharge to a gravity screen which separates the three sizes—1-in., 1½-in., and 2½-in.—and deposits them into the bins below the chutes. For the 2½-in. separation a Robbins revolving grizzly is now being installed. Two other belts carry the material below ⅜ in. to one of the conveyor belts over the bins, and the fifth delivers the ⅜ to 1-in. material from the main screen to another belt over the bins. These two classes are each separated into two sizes by trippers on the belts discharging to gravity screens directly over a partition in the bins, one size going to one side of the partition and the other size to the other side.

A "bumper" screen has been working quite satisfactorily in separating the fine material from ¼-in. size, but will be replaced by a Mitchell vibrating screen which was first tried out on the large sizes with less satisfactory results.

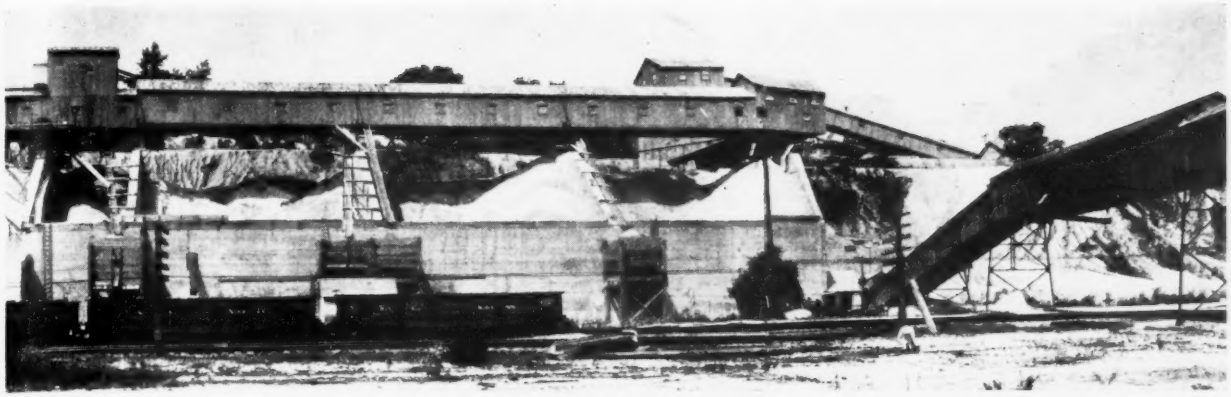
The open concrete bins shown in the illustration have a capacity of about 2,500 cu. yd. each of stone, and below the bins are hoppers for drawing any size or mix-



When the cover is lifted one giant roll of the pair appears like this



This main screen gives three sizes of stone to the five conveyors shown, and these are further separated into seven sizes by screens over the bins

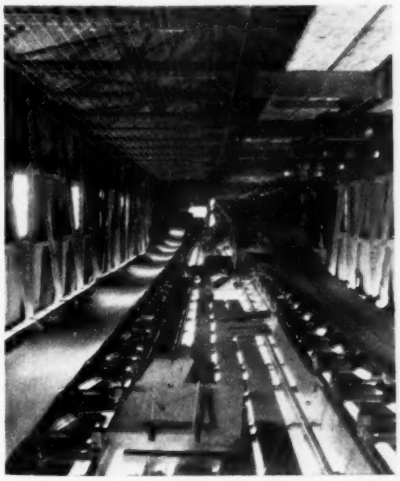


This gallery, with bins below, extends to the left of main screening plant shown. At the right is the gallery to the loading docks

ture of sizes desired to a 36-in. belt in a tunnel below the bins, which feeds to another 36-in. belt going over the adjacent railroad tracks where stone is loaded in cars or on to the loading dock.

The company has in mind now plans for increasing the bin storage capacity in order to provide greater elasticity at the plant.

At one time the company installed apparatus for washing the stone as it left the initial screening plant with the desire to make it possible to blast without stripping and at the same time getting rid, in the early stages, of the fine material for which there is little market and making it unnecessary to send this material through the remaining screens.



Inside the long gallery over the bins these two belts carry material to trippers which deliver to the final stationary screens

A large washer was tried out, but did not work altogether successfully and the company is working on other plans at the present time for washing its stone.

The power plant which drives the entire operation is located in a 70x80-ft. steel building. Three 300-hp. boilers with feed pumps supply steam. A 1000-hp. cross compound condensing engine, direct connected to a 15-in. line shaft

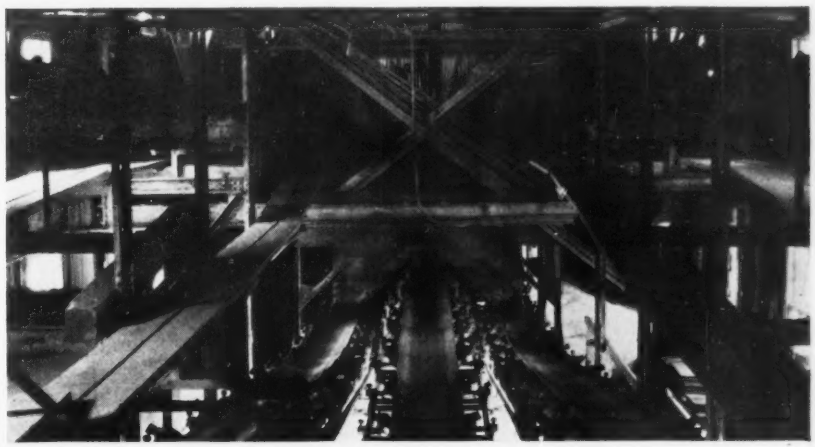
Final screening is done by stationary screens over bin partitions below a tripper on the belt

drives the three crushing rolls. A 600-hp. cross compound condensing engine direct connected to a 550 volt, 3 phase, 25 cycle alternating current generator, provides power for the rest of the machinery. Water for the boilers is supplied from a fresh water stream a mile away. Water for condensing purposes is pumped from a sump at the northern end of the quarry, through the condenser and out into the river. If at any time there is not sufficient flow of water into the quarry to feed the condenser, part of the discharge is by-passed back into the quarry where it cools before reaching the sump. In this way the quarry is kept pumped out and the condenser fed in one pumping operation.

Oklahoma's Test Road

OSAGE county, Oklahoma, will build a 2½-mile hard-surfaced road west of Pawhuska as an experiment in the use of native stone.

If this strip proves satisfactory, the entire county, the largest in Oklahoma and the heart of the Osage nation, will be covered with this class of roads. The cost is $15,000 a mile. Tests have shown that Osage county stone is probably the best in the state for highway building.



Here are the five belts from the main screen. The upper ones are barely visible at left and right near the top of the illustration

No More Coal and Car Disturbances

That is the aim of proposed legislation to regulate the coal industry. To prevent recurring struggles between miners and operators means to prevent the regular coal shortages which now occur, with the resulting confusion in car supply. Herbert Hoover, in an address before the Salesmen's Association of the American Chemical industry, explains the situation and states his position in favor of the proposed step

THE favorable progress of legislation for the creation of a national coal commission fully empowered to get to the bottom of the troubles in this industry is the first step in one of the most vital problems we have. I have been earnestly recommending such a commission for the last three years, because I do not believe great solutions are to be found out of emotional denunciations, but out of sober, scientific examination.

When the public can be made the victim of infinite loss and suffering by such disagreements as we have witnessed; when the whole nation can once every two years or less be pushed to the edge of the precipice of want and commercial collapse; when our public utilities, hospitals, schools and kitchens are dependent upon short rations of non-union coal; when the federal government is forced to interfere with business and transportation to secure even this movement to essential points; when we are brought to consideration of price fixing against extortion in peace times; when hundreds of thousands of workers not only in the industry but outside of it are thrown into skimping and starving; when the nation is made to suffer the shame of Herrin and rampant crime that has followed in train of strikes—then some examination of our industrial sanity is called for.

Employer-Employe Relationship

There is much in the industry that needs public ventilation, but more important than this, there are two distinct lines of problems for which constructive solutions are needed, that can only be furnished after more considered investigation. The first of these problems is the employer-employe relationship; the second is economic reorganization of the industry.

The present relationship of employer and employe in the industry comprises a periodical national danger, because with national organization and national disagreements it means national stoppage. In the end the issues of the struggle are consciously or unconsciously imposed by pinching the welfare of 99 per cent of the community who are not parties to the quarrel. And through subsequent prices the public pays the bill. The public, therefore, has a right to a voice in this whole business.

Surely fair play can be obtained for employer and employe in our civilization without war on the public. But it is not sufficient to shirk the issue by saying that there must be fair play. We must discover the machinery by which fair play can be delivered to all sides. We must have continuity of production in this essential commodity under righteous conditions of employment if we are to maintain the welfare of the nation at all.

I believe such a commission would find that collective bargaining, conciliation and arbitration upon their present basis of organization have in sequence broken down in this industry, as witness the long stoppages in production which all these processes are supposed to end. In this connection, if we examine the inside workings of this recent strike, we will find situations new in industrial relations. Under freedom from the restraint of trade laws the workers' organizations have grown in strength, solidarity and devotion; they have shown able leadership, whereas the organization of employers for the purpose of collective bargaining has been to a large degree destroyed by the action of these very laws. Without entering into the history or rights or wrongs of this phase, the bare fact exists: That the recent agreement in the bituminous industry was determined by only 15 per cent of the employers and this minority's decision controlled the whole.

From the public point of view, these things are only of importance as they contribute to interruption in production. The greater proof that the conception of collective bargaining in this industry has failed upon its present basis to secure any assurance of protection to the public is the famine in coal.

All Bargaining Controlled in Public Interest

The federal laws on conciliation have failed to obtain any results for peace. The conception of arbitration is a settlement based on mutual agreement to abide by the decision of a third party, but this is now refused "on principle," for in this industry the workers consider that arbitration always results in compromise and that this is compromise with their bread and butter. Thus all of the old conceptions of mutual settlement in the industry have failed. We may well preserve the old methods of peace, but of a certainty they must be better organized, and we need something more that will bring a positive insurance of peace to the public. Nor is the organization of employers on a national basis the answer, for in such case, while collective bargaining might proceed more smoothly, the public could well take alarm that the costs of any bargain can be passed on to the consumer. Therefore such bargaining must be controlled in the public interest, even if it served to prevent stoppage.

The Public's Rights

There are many rights that have grown up around these industrial relations. Workers have a right to organize to protect and improve wages and conditions of labor. They have a right to collective bargaining. They have a right to strike. They have a right to refuse to join such organizations. They have a right to work without intimidation and assault. Employers have a right to refuse to recognize such organizations. They have a right to lockout. They have a right to keep open shop. No one seriously denies any of these rights, but a lot of people are overlooking a superior right. That is the right of the public to a continuous supply of its vital necessities and services upon terms fair to the employer and employe. When these various rights infringe upon the public right, then the dominant right is the public right.

I do not propose to anticipate the conclusions of the commission as to methods. My desire is to emphasize the vital importance of its mission.

Nor can the problem be solved solely by treatment of employment relations. There is essentially the need for constructive thought that will devise remedies for a multitude of evils that give rise to great industrial wastes and breed much of the employment difficulties. They bring great burdens upon the public workers and operators.

Aside from employe relationship, most of the economic demoralization lies in the bituminous, as distinguished from the anthracite, industry, and my discussion hereafter refers to bituminous alone. This industry functions very badly. Some state glibly that it will work itself out if left alone. But it must be borne in mind that it has not been left alone in the past and the present situation is in large degree due to legislative interference. The control of combinations among operators without such restraint among employes, the rules of artificial car distribution, the state legislation of various sorts and other acts have a great responsibility for the present condition. I am not questioning the necessity of these measures, but their influence in the situation must not be overlooked and they must be either supplemented or amended by wise provisions if we are to have coal peace.

Harm of Intermittent Operation

There are 8,000 bituminous mines with an annual capacity of 850,000,000 tons, 300,000,000 capacity beyond our national needs. The over-capacity in the industry results not in the permanent closing of some mines but in the operation of all of them more or less intermittently. Thus the working personnel is held attached to each mine in daily hopes of employment. In the best year of their history the bituminous mines operated an average of only 249 days in the year out of a possible 308, whereas in most years the average is about 210, as against about 295 days in England and over 300 days in Germany. If we subtract the mines which are operating regularly for certain metallurgical and railway supplies, we find that the situation is even worse, for the remainder of the bituminous mines are probably operating an average of less than 180 days, or over 102 days' lost time.

There are 2500 too many bituminous mines and 200,000 too many people in the business. This waste of labor, of capital and of coal levies tremendous tribute on the entire country. Investment in the industry is extremely speculative. Distribution costs are excessive. The operators vibrate between bankruptcy and high profits. And the public in ordinary times is paying far more for its coal than would be necessary from a stabilized industry.

The perpetual labor difficulties are but one of the inevitable by-products of this poor organization. Labor is struggling on one side to set up remuneration based on such day's pay, and such piece-work rates, as will give a standard of living from 60 per cent of time employed. Labor is thus honeycombed with the worst of stimulants to unrest, insecurity of employment. At the same time, men who have the opportunity to work full time in regularly operating mines earn returns far above the average income of our most prosperous farmers and other workers. There can be no solution either to the operators or to the workers as long as this condition continues.

The largest contributor to over-expansion of the industry is now the almost regular biennial quarrel, with its undue prior demand for coal and its subsequent shortage with temporary high profits. This results in intermittent operation of many mines at a loss in the lean period between strikes or threats of strikes. The war demand and profits have also contributed this over-expansion. Beyond this the non-union mines in the South, with a capacity of over 300,000,000 tons per annum, being able to secure a lower wage level than the union mines in the North, at times of sharp competition are enabled to undersell Northern coal and are gradually causing the industry to migrate from the North to the South, with consequent over-equipment in the North.

Bad Car Distribution

Intermittent operation also arises in the chronic annual shortage of railway cars because a sufficient car supply for the short-peak period is economically impossible to the railways. A bad system of distribution of cars to mines by the railways contributes also, because under the present methods the fly-by-night operator has a right to demand his quota of cars in times of good demand and paralyzes the ability of the systematic mines to comply with their contracts or to maintain regular operation. There is inadequate storage at points of consumption to take up slack from seasonal and daily intermittent production. The marketing machinery itself creates intermittency because of the incessant shifting of contracts from one mine to another. Furthermore, the high unit wage basis encourages absenteeism and thus at times an irregular supply of labor; there is a perpetual rain of small and local strikes, all directly and indirectly contributing to intermittent operation — for all of which the public pays. What we want is greater continuity of production as a basis for smoother relations and lower costs.

Aside from relief from national stoppage in production from strikes and lockouts, there are proposals of constructive and practical remedies which should be investigated and which do not lead to socialism and destruction of American freedom and initiative. For instance, an extra annual storage of 20 per cent of railway consumption would equalize the seasonal fluctuation. Larger storage is possible by the railways at those times when public demand for coal is slack instead of competition by the railways themselves with the public for coal, and thus for the use of cars, at the annual period of car shortage. A system of car distribution that would not itself break into regular operation would help. Larger storage by public utilities would assist and would give greater security to the public.

A contributing remedy that will need the most earnest consideration is the possibility of permitting the co-operative system of marketing developed by the farmers to be applied by such mines as wish to adopt it, under circumstances that would assure competitive conditions. Such an arrangement would decrease distribution costs, would give more regular flow to orders, would get better car distribution, would decrease transportation, would enable the laying down of coal in storage at points of consumption, and would consequently give more regular operation with reduced working costs. More accurate statistics of capacity, production, consumption stocks and prices would greatly promote stability and would be in the true interest of the operators who are now blamed for much that is not their fault.

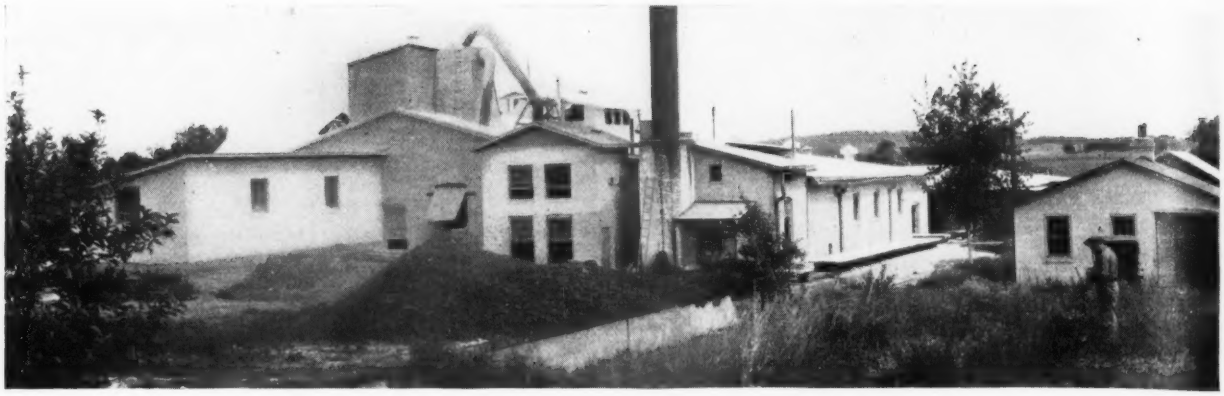
It has also been proposed — although I have doubt as to its practicability — that there should be a penalty in higher wages for short-time employment. Proposals are also made for a basic wage with a participation in the realized price of coal.

Of dominant importance, however, is the fact that the whole employe and employer relationship requires reform if we are to secure a stable industry. Much friction would of course disappear if there were less intermittence. The instability of these employment relations themselves form a vicious circle of quarrels. Collective bargaining has a fundamental value in the industry in the maintenance of standards of wages and conditions of labor, for otherwise the workers, because of competitive drive for low costs, would never have arisen from the impossible conditions of years ago; but the breakdown of true collective bargaining in the biennial conflict, the constant local violation of agreements and the multitude of small strikes are themselves proofs that it needs better organization and public participation with guarantees.

Why Stability Is Opposed

I recognize that stabilization of the industry, or anything that lends stability to the industry, is opposed by a small minority of speculative operators who use the periodically disturbed production to reap a recurrent harvest. It would be opposed on the other side by some of the more narrow-minded labor leaders who contend that their object in all industry is to reduce the number of hours of actual labor to some minor fraction of the whole year, or whose ambition is to drive the nation to socialism in desperation for coal, or who deny the public right to any voice.

These periodic wars in the industry are, therefore, in part symptoms of a disease. But before we treat this disease we must have a more accurate diagnosis. We must have adequate, accurate information from which to weigh the different causes. We must be able to apply to all the test of fact. From such an understanding we should be able to return this industry to sanity. The proposed commission has the greatest opportunity for constructive work since the war. The public demands results.



This plant is one of the most up-to-date in manufacturing methods for sand-lime brick

Better Methods for Making Sand-Lime Brick

The Belt-Line Brick Co. of Minneapolis, Minn., is able to produce 75,000 brick daily with the aid of modern labor-saving machinery

By Charles A. Breskin

THE process for manufacturing sand-lime brick was discovered and patented in 1880 by Dr. William Michaelis. It consisted primarily of four essential steps; first, to add to a required amount of sand a proportionate amount of thoroughly hydrated lime and to mix the two intimately; second, to add enough water to the sand-lime mixture to bring it to such consistency that it will hold together when molded; third, to press the damp mixture in the desired form; fourth, to cure the brick by means of steam under pressure. This steam-curing causes chemical reaction between the lime and some of the sand to form a calcium silicate, which acts as a binding agent and holds the rest of the sand together.

Dr. Michaelis permitted his patent to lapse without any exploitation and immediately thereafter a number of modifications were patented and the manufacturing of sand-lime brick began. As the modification patents were of no special value, they were entirely abandoned. They did prove to be of value in this way: Attempts to sell them aroused and stimulated interest in the sand-lime brick industry.

A Bit of History

The first sand-lime brick plant in the United States was built in Michigan City, Ind., in 1901. In 1903 there were 16 plants operating and in 1907 there were 94. Since that peak year, the industry gradually declined until 1919, when there were only thirty-odd plants in active operation. Since then, however, the industry has taken on new life and production is rapidly increasing. All plants in the United States operate under the original Michaelis patent, which is free to anyone who desires to use it.

President and secretary of the company, W. B. Chandler, is at the left; at the right, John Zellie, superintendent

In the early history of sand-lime brick manufacture there was considerable experimenting and it was not without great difficulty that this brick established itself as a permanent building material. Putting the industry on a paying basis was fraught with numerous vicissitudes and the hardships encountered put many plants out of business. Today the industry is on a sure footing and in many localities, especially those where clay brick is scarce, sand-lime brick is an indispensable product. In such localities sand of fair quality is usually abundant and the ability to make brick of this sand has placed within reach of the users a durable, non-combustible building material—a home product with reasonable transportation costs. Not only that, sand-lime brick has crept in on localities where clay brick is cheap and has firmly established itself on a practicable paying basis. Today, one can go to Milwaukee, Minneapolis, Dayton, Rochester, Grand Rapids and many other places and see many buildings of sand-lime brick.

Roughly speaking, it has been a few years only that any great change in sand-lime brick manufacture has taken place, but recently the more modern plants have eliminated the wet pans for mixing and have substituted bar mills or similar machinery to obtain greater efficiency. In hydration of lime, while there have been no great changes, more attention has been shown it. The rotary press has been gradually taking the place of the vertical press and material-handling machinery has been so perfected as to practically eliminate manual labor in the whole process.

The Belt-Line Brick Co. was organized

in 1907 when sand-lime brick manufacture was at its height and a plant was located 12 miles north of Minneapolis, Minn., near New Brighton. It was organized by a number of men who knew nothing of sand-lime brick other than that it would bring a fair price and that there would be a good market for it in the Twin Cities and surrounding localities. The troubles encountered in putting this plant on a paying basis would make a long story in itself. However, the company was fortunate in having for its executives far-sighted, practical business men and today it stands as one of the really progressive sand-lime brick enterprises. Since its organization it has expanded considerably. In 1921 the entire plant was rejuvenated and equipped with labor-saving machinery and devices to make a better sand-lime brick. Today it is one of the most modern sand-lime brick plants in the country.

The scraper in the sand pit is guided by the operator shown

The two raw materials entering into sand-lime brick manufacture are sand and hydrated lime, and since the former constitutes from 85 to 95 per cent of the weight of the brick, it is the more important. The Belt-Line Brick Co. is fortunate in having a 60-acre sand deposit within easy access of the plant. This sand lies on the surface in a bed of from 15 to 40 ft. thick, is unusually clean, of a fairly uniform texture, and contains no gravel. It is fine enough to allow 65 per cent by weight to go through a 100-mesh screen. The grains are angular in shape and are said to give a better brick than that made of round grains because the projections of the sharp sand help to fasten the bonding material securely.

The sand at the Belt-Line deposit is excavated by an Albrecht excavator, driven by a 20 hp. motor, and has a capacity of 300 yd. per hour. This portable machine is operated by two men, one guiding the scraper and the other operating the cable hoist. The sand is loaded into 1-yd. steel rocker cars and is hauled by mules to the sand receiving shed. One man is required for this operation.

Screening and Handling the Sand

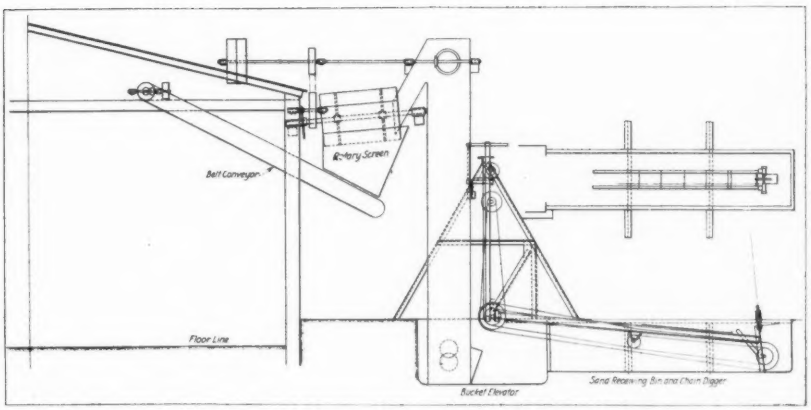
As it enters the plant the sand is dumped into a steel receiving pit 4x4x19 ft., in which is a Toepfer digging chain, 17 ft. 6 in. between centers. The drive end of this chain is fixed while the lower or digging end may be lifted to any desired angle. This is accomplished by having the digging end attached to a cable running through a set of sheaves. The cable winds up on a clutch-connected drum on one of the drive shafts. Thus, if the receiving bin is full of sand, the digging chain is raised, and as the material is gradually taken away, the chain is gradually lowered.

The digging chain deposits the material in the boot of a bucket elevator 22 ft. between centers. The sand is elevated and discharged to a rotary screen 4 ft. diameter by 6 ft. long, fitted with ½-in. perforations and running at 14 r.p.m. The oversize, of which there is very little, consists of twigs, roots, etc., and is discharged to a waste pile outside of the plant. The fine sand drops into a hopper and is fed to a 24-in. conveyor belt 30 ft. long, located immediately above the sand storage.

As it is needed, the material is taken out of the interior sand storage by a 20 ft. Toepfer digging chain, fitted with the same hoisting arrangement as the receiving-pit digging chain. The sand is dragged within reach of a small chain elevator of 12 ft. centers and discharged to the sand hopper or storage immediately above the proportioning box.

The cost of delivering the sand to the plant ready for passage through the mixing machine is approximately $25 for 125 yd., or 20 cents per yard.

Sand is excavated and loaded to dump cars to be hauled to the plant



Sand enters the plant by this apparatus. The sand receiving pit at the right has a digging chain, and a bucket elevator, rotary screen, and belt conveyor serve to provide clean sand for storage inside the plant

Hydrating the Lime

While the lime used in making sand-lime brick is relatively small, its quality is of utmost importance. It must be high in calcium content and be perfectly hydrated before mixing with the sand. If not, the brick will expand during steam treatment and produce internal strains which are sufficient to burst the brick.

The Belt-Line Co. purchases its lime in lump form from LeRoy, Minn., or from Manistique, Mich. It comes to the plant in box cars and is unloaded direct to an Acme hydrator, being weighed between the car and the charging cylinders of the hydrator, so as to keep a check on the amount used.

The Acme hydrator, specially designed for hydrating lime for sand-lime brick manufacture, is operated very successfully here. It is giving a thorough hydrate and the resultant brick is much better than was formerly produced with the lime hydrated by the "quencher" system.

This hydrator consists primarily of a pair of cylindrical drums mounted to rotate on parallel axes slightly inclined to the horizontal. The upper ends of the cylinders are closed, the lower ends are fitted with plates which can be moved by regulating screws in and out of the cylinders. From each cylinder is a connection leading to a stack which carries away the steam generated during the hydration of the lime.

A known amount of quick lime is dumped into the continuously rotating cylinder. The proper amount of water is then added from a measuring tank and left in the cylinder until hydration is complete, when the plate at the lower end is withdrawn sufficiently to leave a space of about 1 in. between it and the cylinder. The hydrated lime flows through this opening and is picked up by a screw conveyor and taken to a Raymond air-separation pulverizer.

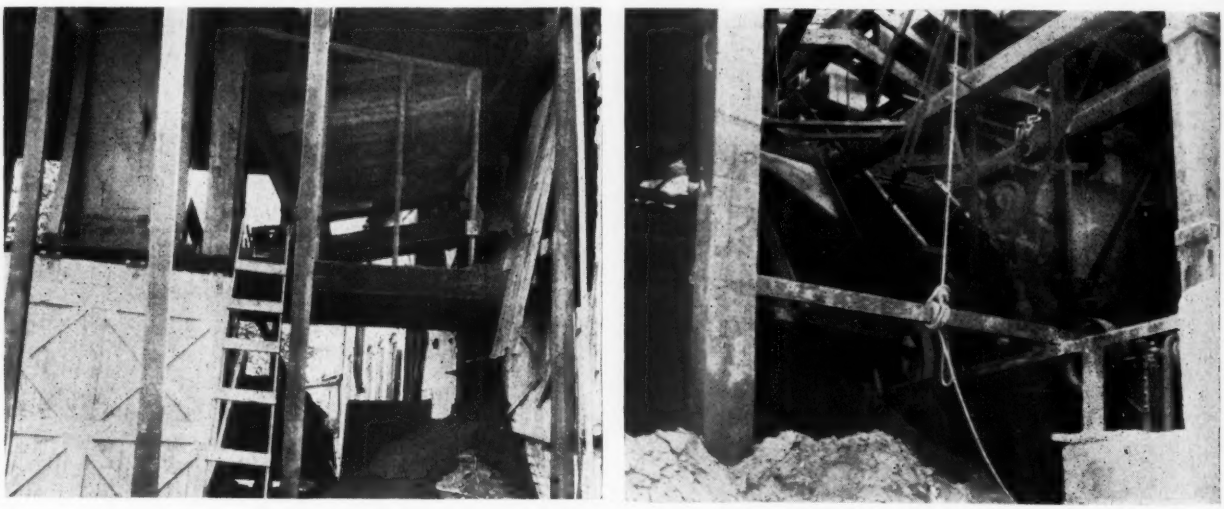
The two hydrator cylinders are used alternately—that is, one is filled while the other is emptied—and this really makes the hydrator a continuous machine. The amount of water and the time of hydration vary; they are determined largely by experience. It is unnecessary to crush the lump lime with this type of hydrator. The dust and steam created during hydration are drawn up a stack into a dust-collecting chamber where the fine hydrate particles are separated from the vapor, to be returned to the machine; the steam escapes through another stack. The hydrator is dustless.

The ground lime from the Raymond mill is deposited in two storage bins having a capacity of 20 tons each. It is drawn out by a screw conveyor and deposited in a hopper or storage immediately over the proportioning box.

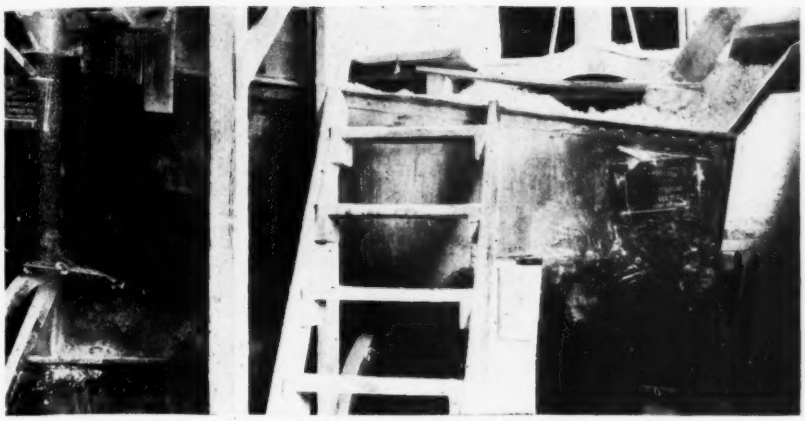
Mixing the Material

The proportioning box is immediately above the bar mill and into it is drawn a certain amount of sand and lime, the proportions being about 90 per cent of the former as against 10 of the latter—this by volume and not by weight. In the proportioning box is a right-and-left screw conveyor and both the sand and the lime are fed into the bar mill simultaneously.

Probably the most important step in sand-lime brick manufacture is the thoroughness with which the sand and lime is mixed, and this operation is a determining factor in the quality of the resultant brick. The lime and sand should be in intimate contact so that a chemical action between them can take place readily.

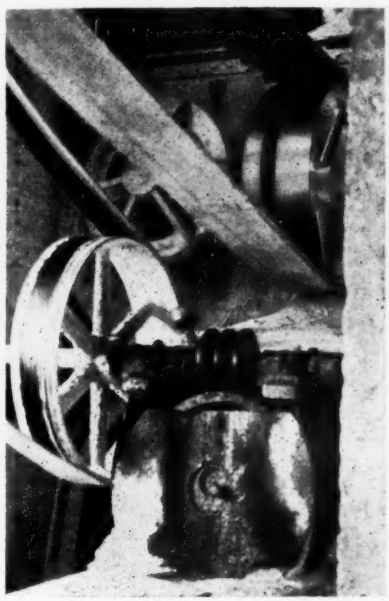


The bucket elevator and screen shown at the left convey sand to the inside storage pile shown at the right



At the right of this hydrator is its charging door, and below are the screws which control the outlet doors

The machine used for mixing at this plant, known as a Toepfer bar mill, is 48x108 in. and is filled with three tons of heavy rods 3½ in. or better in size. The mill has cast-steel liners and a perforated bar-retaining head at the discharge end. It has a 100,000 brick per day capacity and is driven by a spur-girth and a mitre-drive gear. The mixture in the bar mill is really ground as well as mixed, on a line contact rather than on a point contact, and the action is such that every particle of sand is coated with a particle of lime, which is the proper medium for facilitating chemical action.



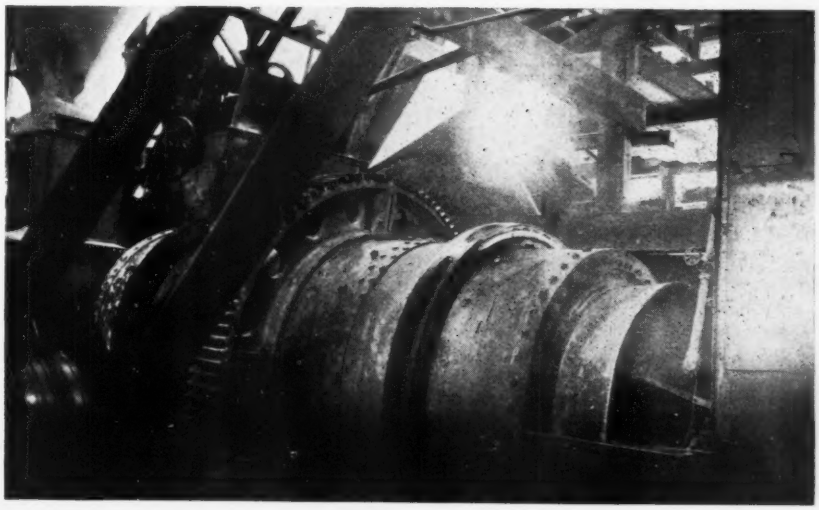
The worm and worm gear in the illustration drive a screw conveyor below the hydrator which carries hydrate to the Raymond mill

As the sand-lime mixture is discharged from the bar mill a definite amount of water is added to give proper consistency. If too much water is added, the brick cannot be properly pressed; if too little, the material is likely to crumble after pressing.

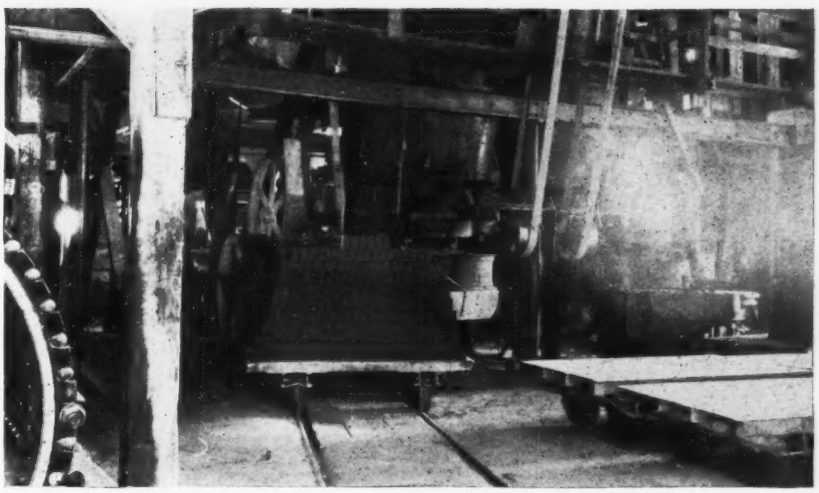
The mixture from the bar mill is fed to a bucket elevator, the discharge end of which is fitted with a threeway spout. Two of the spouts discharge the mixture direct to two storage bins above two brick presses. The third spout discharges to a short belt conveyor which carries the mixture to the third storage bin above the third press. This arrangement is shown in one of the accompanying drawings. The bins above the presses have an individual capacity for 2500 brick.

Pressing and Curing the Mixture

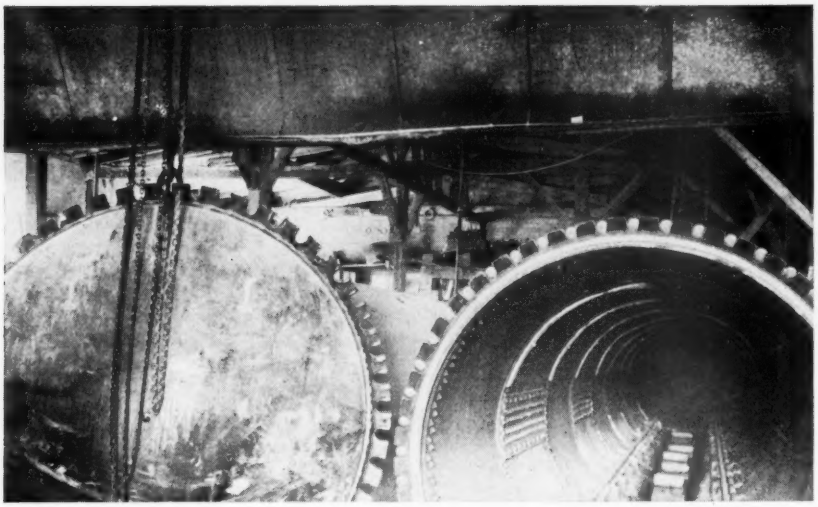
The mixture from the storage bins



This bar mill with thre tons of steel rods mixes thoroughly the sand and lime, which is moistened as it leaves the bar mill to prepare it for pressing in the rotary presses shown below



Brick are molded in these rotary presses before going on cars into the hardening cylinders



Truck loads of pressed brick are hauled into these cylinders and hardened under 120 lb. steam pressure for eight hours. Chain hoists are used in bolting and unbolting the cylinder heads

above the presses is fed to the presses by revolving discs in the bottom of the bins, fitted with knives, which cut off the proper amount of material and drop the mixture into the agitators over the presses, then going into the pockets of the press proper. In this plant there are three Jackson rotary presses.

Pressing the brick is also an important function, for besides giving the brick its shape, it brings the sand and lime into intimate contact, thereby again facilitating chemical action. Also, the compression of material reduces the percentage of voids and produces a less porous brick; the final strength of the brick is dependent upon the pressure exerted in molding it. The rotary press discharges the brick by pushing it to the surface of the table, whence it is picked by hand and loaded on waiting flat cars.

Each car, holding 1100 brick, as soon as it is loaded is trucked away to the hardening cylinders. There are six such cylinders, four being 6 ft. 6 in. x 47 ft., the remaining two, 6 ft. 6 in. x 56 ft., the combined total capacity being 72 cars, or 79,200 brick. The hardening cylinders are made of steel plates so riveted together as to withstand great pressure. The shell is set up horizontally and the tracks for the cars are laid in the shell bottom.

After a cylinder has been loaded to full capacity, the head is bolted on. The mixture is then ready to be cured or to be subjected to high steam pressure. This operation takes place during the night, as the presses are operated only during the day. Live steam is gradually turned into the hardening cylinders until a pressure of 120 lb. is obtained, and then the brick are cured at this pressure for 8 hr. The steam is then blown off, the head removed, and the cars of brick are taken out of the hardening cylinders and transferred to the loading platform for shipment or trucked away to the storage.

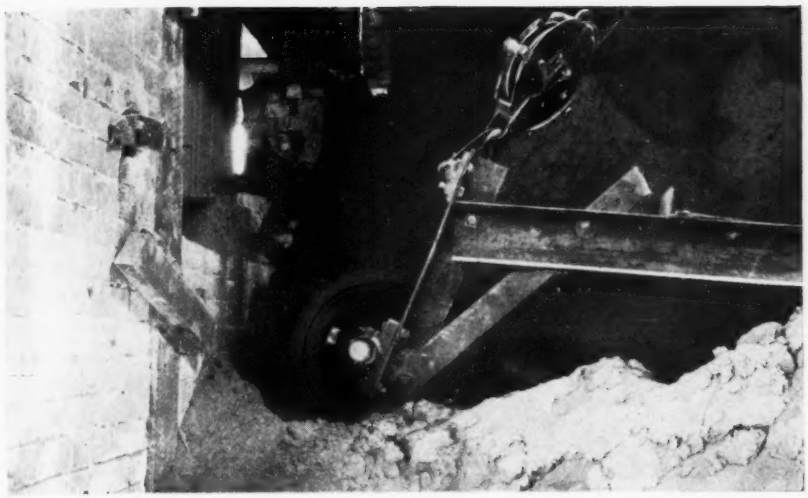
The brick storage at the Belt-Line plant is under a steel roof and will accommodate 1,500,000 brick. At the time of the writer's visit (August, 1922), preparations were being made to double this storage. As this company also has a large country business in clay face brick there is a side storage for 200,000. All brick, whether for storage or for car loading are handled by Mathews gravity conveyors. For car-loading straw is used and the brick staggered, the total breakage being less than 4 per cent.

These men get paid the same for making 75,000 brick a day, whether it takes them five hours or ten

From this storage shed roller gravity conveyors are used for loading the brick into box cars

The Power Plant

Steam is furnished to the hardening cylinders and engines by two 125-hp. water tube boilers. Both boilers are not operated at the same time, one being used during the day to furnish steam for a 150-hp. Corliss engine which drives all the plant machinery. A 30-hp. generator which furnishes electricity for a 20-hp. motor on the Albrecht excavator, 10-hp.



From the inside storage sand is taken by this chain sand digger, the end of which may be raised or lowered. It is controlled by a cable through sheaves and on a drum, clutch-connected to a main driving shaft

on the sand digger and 3-hp. in the machine shop, is driven by a separate, direct-connected 30-hp. vertical steam engine. A lighting plant is also provided and a 6x36-in. deep-well pump furnishes water from a 188-ft. well to the boilers.

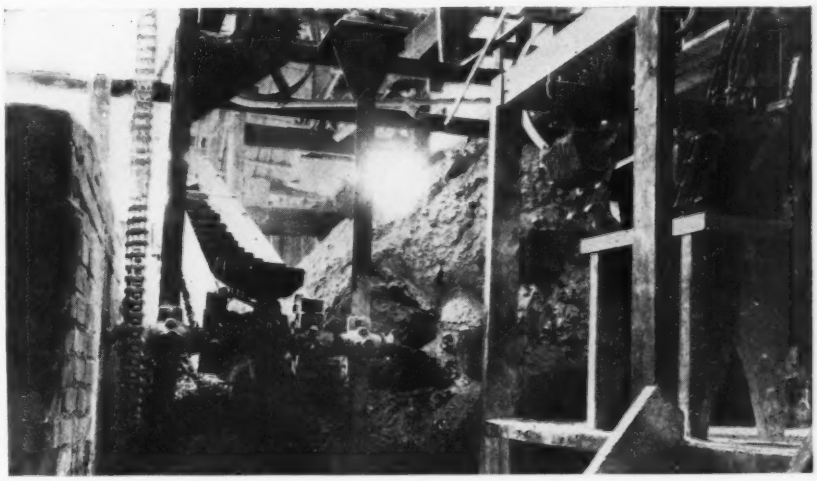
The big feature in the operation of this plant is that, day in and day out, the production is always 75,000 brick. If there is no immediate market for the brick it is put in storage, continuous operation to full capacity has been the means of producing a good brick cheap and has had much to do with the progress made by the company. Labor is not paid by the hour or by the day, but on a basis of producing 75,000 brick daily. The time element does not enter here. The men get on the job, produce the 75,000 brick in the shortest time possible, and then go home. The entire plant is operated by 20 men, including the fireman and engineer.

The company is on a belt line railroad —that is how it got its name—operated jointly by the nine railroads centering in the Twin Cities, namely, the Great Northern, Northern Pacific, Chicago, Milwaukee & St. Paul, Minneapolis, St. Paul & Sault Ste. Marie, Chicago, Rock Island & Pacific, Chicago, Burlington & Quincy, Minneapolis & St. Louis, Chicago Northwestern and Chicago Great Western. It can ship over any one of these four lines with great advantage in freight rates. Since 1907 the plant has shipped over 166,000,000 brick, half of it to country localities and half to the Twin Cities.

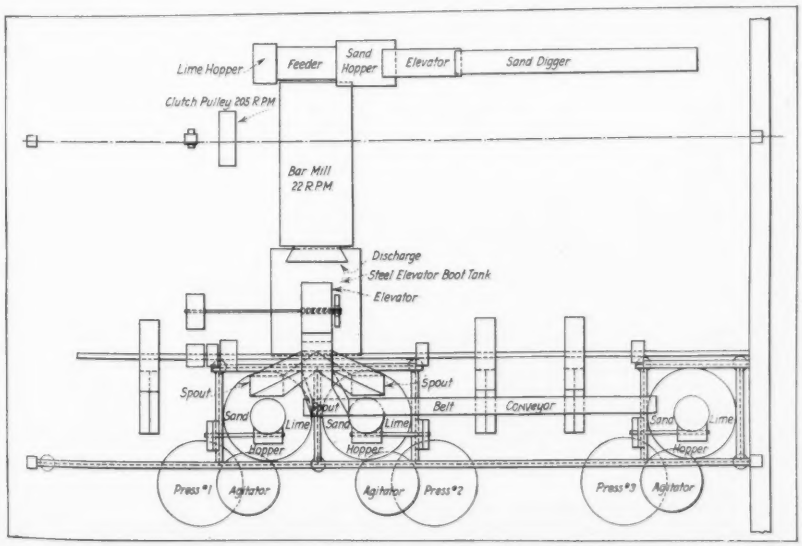
Organization Personnel

The officers of the Belt-Line Brick Co. are W. B. Chandler, president and treasurer; C. H. Robinson, vice-president; E. G. Chapman, secretary and John Zellie, superintendent. It was Mr. Chandler who fostered the plant from its very beginning and it is largely due to him that the company is so progressive. Superintendent John Zellie grew up in the plant, starting as a water-boy, and has been with the company since its very beginning. The company is a member of the Sand-Lime Brick Association.

The construction and engineering features of this rejuvenated plant—including the chain diggers, screens, elevators, hydrators, storage bins—were furnished by the W. Toepfer & Sons Co., Milwaukee. The Albrecht excavator was supplied by the T. L. Smith Co., Milwaukee.



This digging chain delivers sand to an elevator going to the hopper above one of the proportioning boxes



How the bar mill, sand-lime hoppers, agitators, and presses are arranged

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THE Cement Products Co., of Renton, Wash., was recently awarded the contract for 5000 ft. of concrete sewer pipe for the septic tank job for the city of Renton.

A Capacity Load for Every Car

That is how this company is increasing its shipments by 10 per cent, and getting other benefits, too

LOAD cars to capacity, load them promptly and get them on their way, and urge customers to unload them the same day they are received. This is advice which aggregate producers have heard before, especially in times of car shortage, and it is advice which every producer wants to follow out, but he is not always able to do so to the fullest.

The Janesville Sand and Gravel Co. of Janesville, Wis., is loading cars to capacity. There is no guesswork about it; they know when a 50-ton car has 50-tons and none are sent out with 48, 46 or 40 tons because the guess of the loader was not accurate. Such a guess can never be accurate, and with the equipment to eliminate the necessity of guessing the company is obtaining at least 10 per cent greater volume in its shipments because it knows how much sand or gravel goes into a car.

The whole thing is accomplished by means of track scales on which the car being loaded stands, and an automatic device for notifying the loader when the car is filled to capacity. The small bin capacity of the company makes it possible for a car to be loaded from any bin while standing wholly on the scales. Similar scales, however, would be feasible in almost any plant by the addition of special chutes to load into the car while it is standing on scales.

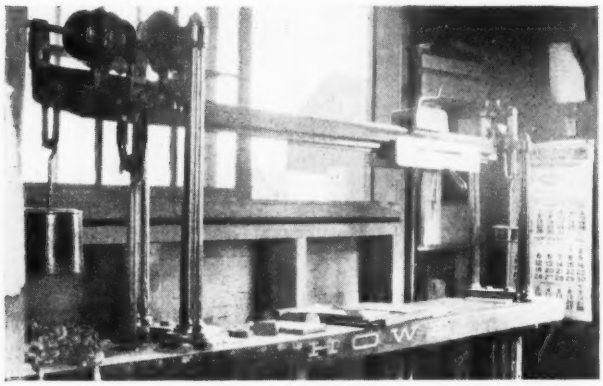
The operation works this way: The empty car is spotted on the scales, the car is weighed by means of the balance in the little weighing house beside the track, and the counter-weight is set on the beam at the weight of the car plus its maximum capacity. Material is loaded into the car through the spout from the bin until when exactly the right amount of material has been put in the car the beam is balanced and as it rises it makes an electrical contact which rings a well-protected gong located on the bin house just below the platform under the loading spouts. At the first sound of the gong the loader immediately shuts the gate and stops the flow of material, and the car is allowed to run down the tracks by gravity while another car takes its place to be loaded. The electrical contact is made when the swinging end of the beam rises and touches the upper portion of the beam guard. Wires from these two contacts through batteries connect with the gong on the bins and give the warning signal.

A gong located just below the platform under the loading spouts warns the loader that the car has its capacity load

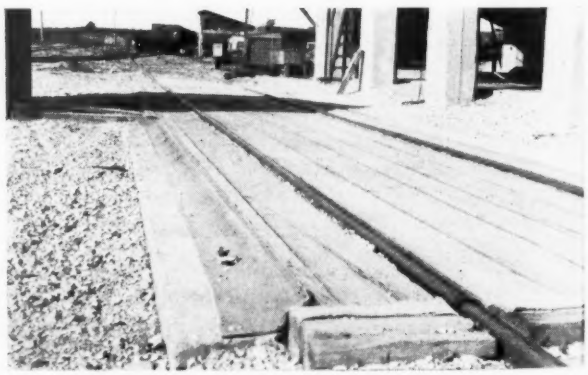
It is necessary to protect the scale mechanism from any sand and gravel which might overflow or spill and get into the cracks of the scale platform and into the scales below. This protection is accomplished by means of strips of old belting carefully nailed over the entire length of all these cracks.

Employes of the company have been sworn into the Western Weighing Association so that the recorded weights taken at the plant are accepted by the railroad and the customer as correct.

Not only does the company increase its volume of shipments by having the cars loaded to capacity and weighed as they are loaded but the cars so weighed are ready for immediate shipment to destination and are not delayed in the railroad yards waiting to be weighed. Other users of open-top equipment are benefited, the railroads get a greater revenue from their cars by receiving payment for the full capacity loading, and the Janesville company benefits most of all by its increased tonnage and prompter shipments, which give it greater volume on each shipment and which give its customers greater confidence in the ability of the company to ship promptly.



On the beam of the scale the counterweight is set at the weight of car plus its capacity load, and as soon as the load is enough to raise the beam an electrical contact is made which rings the warning gong



Care must be taken to keep sand and gravel out of the scale mechanism. Old belting has been used as shown here to cover the openings around the platform and protect the scale machinery below

More Car Relief Is Now in Sight

AT the request of the National Association of Sand and Gravel Producers, made on September 1 to the Interstate Commerce Commission, a formal hearing before the commission was granted and held on September 21 at Washington. The hearing was requested with a view to securing reasonable modification of the service orders affecting car supply to the producers of aggregates. The petition of the association was published in the last issue of ROCK PRODUCTS.

A preliminary meeting of sand, gravel and stone producers was held in Washington on September 20, at which a program was laid out for presenting testimony to the commission in supporting the claim that service orders 23 and 24 were working an injustice to the industry. More than 30 sand producers from all parts of the country were present and several representatives of the National Crushed Stone Association were present to add to the testimony presented. The attitude shown by the commission at the hearing was very favorable and it seems very reasonable to expect that as a result considerable relief will be afforded to aggregate producers in a more adequate supply of cars, especially where important construction work is concerned.

The hearing is well summarized in the following telegram from C. A. Breskin, who attended the meeting:

"Sand and gravel producers met Wednesday, September 20, at Washington Hotel and formulated plan of action for hearing before Interstate Commerce Commission which was called at 10 a.m. September 21, Commissioners Aitchison and Cox presiding. Alex W. Dann, president of the National Sand and Gravel Producers Association, in opening, said producers wanted only a fair and square deal in the matter of transportation, that there should be no discrimination, and asked for a modification of recent priority order in this connection.

"Under date of September 19, commission issued service order No. 25, effective September 25, which says that railroads east of the Mississippi river give priority to following commodities: Food, live stock feed, live stock, seeds, newsprint paper, coal, coke, and other fuels. Also railroads must give priority to movement, exchange and return of empty cars for loading and shipping same commodities. Also coal mines have priority on all open-top cars other than those with sides 42 in. and under. Also building construction materials, ore, and fluxing stone may be shipped in open-top cars in the direction of mines but not beyond them. The commodities in this class must be loaded and unloaded within 24 hours of arrival of cars or embargo is placed on shipper and consignee. The above order is an amendment to order No. 23 and will relieve car situation in our industries a little. Sand producers at hearing asked that priority order be abolished and railroads be allowed to handle situation themselves.

"Witnesses for association testified that officials on their railroads told them that there would be plenty of cars for sand and gravel if commission would not interfere with priorities. Witnesses pointed out that construction industry was practically at a standstill and was facing great financial loss. Statements substantiated by R. P. Allport, of Virginia Constructors Association, and by Mr. Markham, of American Association of Highway Officials. Construction work started must be completed before freezing weather sets in, which is only 30 to 60 days, and therefore there must be immediate relief for shipping sand, gravel, and stone. Mr. Dann showed the commission that car reports of American Railway Association showed that sand, gravel, and stone were receiving 85 per cent of quota of cars asked for. This is not so. Case of one producer shown who needed 180 cars and only got four. Many other similar incidents.

"Questions and attitude shown by commission very favorable, and consensus of opinion seems to be that there might be some relief so as to expedite important construction work.

"Crushed Stone Association represented by W. Scott Eames, president; A. P. Sandles, secretary; W. L. Sporberg, president, Rock Cut Stone Co. Syracuse, N. Y.; James Savage, president, Buffalo Crushed Stone Co., Buffalo, N. Y.; B. D. Pierce, Jr., president, Connecticut Quarries Co., New Haven, Conn., and A. Acton Hall, president, Ohio Marble Co., Piqua, Ohio."

A Letter from Japan

IN two recent issues of ROCK PRODUCTS there appeared articles describing the new plant of the Asano Portland Cement Co., in Japan, of which Paul C. Van Zandt is chief engineer. A letter just received by ROCK PRODUCTS from Mr. Van Zandt says there is a great deal of interest in China, India, Australia, and New Zealand in Japanese cement plants, especially the Asano plants.

The following personal items in Mr. Van Zandt's letter will be of interest to men in the industry:

"Mr. A. A. Doney, who has been our chief of erection for five years, is leaving Japan on the 12th of August to return to his home in United States, leaving the employ of the Asano Cement Co. permanently. I suppose he will return to the Allis-Chalmers Mfg. Co., with which company he was formerly associated."

"Mr. Ed. Fleischman, erecting engineer of the Bates Valve Bag Co., in now in Japan and started the first valve-bag filling machine in our Mohi plant. Of course it was perfectly successful, and has created quite a stir in the cement industry here. We have been using barrels too long and will be equipped throughout for bags in the near future."

August Construction Shows Increase of 46 Per Cent

ACCORDING to the F. W. Dodge Co.'s review of building activity for August, contracts awarded in the 27 northeastern states amounted to $322,007,000. This amount is 46 per cent over that of August last year and only 8 per cent under that of July this year.

The August figures bring the total for this year up to $2,362,872,000, which, besides being the largest figure for the first eight months of any year, is greater by $7,000,000 than the total for the entire year 1921. A comparison of this year with last, on the eight months' basis, shows this year to be 58 per cent ahead.

The most remarkable feature of the August statistical statement lies in the fact that industrial construction amounted to $67,373,000, which is 21 per cent of the month's total.

Effects of Breathing Carbon Dioxide

EXPERIMENTS on the effects of breathing carbon dioxide have been conducted at the Pittsburgh station of the Bureau of Mines under the direction of Dr. R. R. Sayers, chief surgeon, and A. C. Fieldner, supervising chemist. About 2 per cent of carbon dioxide in oxygen produced a slight increase in lung ventilation, but no subjective symptoms; 5 per cent in oxygen caused an increase in lung ventilation of about 100 per cent, but no other signs or symptoms; 7.2 per cent produced about 200 per cent increase in lung ventilation, and moderate perspiration and a slight fulness in the head were experienced after breathing the mixture for 10 minutes; 9 to 10 per cent produced about 300 per cent increase in lung ventilation, and the subject complained of frontal headache and was dizzy and perspiring at the end of 10 minutes.

About 9 per cent of carbon dioxide in oxygen was breathed by some of the subjects for as long as 45 minutes, but the breathing was very laborious, and dizziness, headache and perspiration were marked—in fact, to have done any work while breathing this mixture would have been extremely difficult.—From U. S. Bureau of Mines.

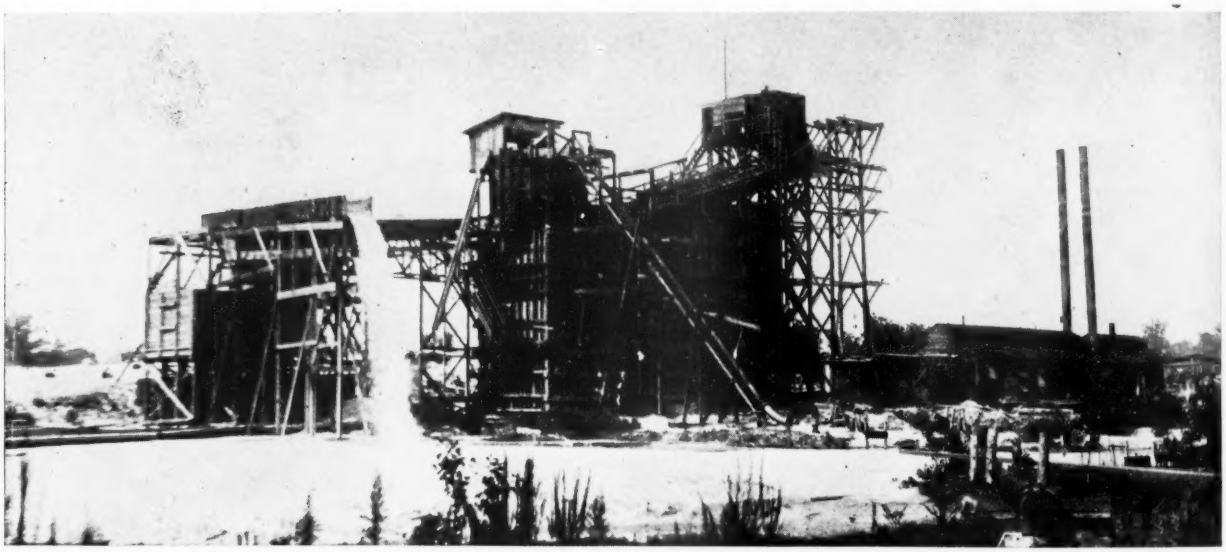
This Sand and Gravel Plant Is a Model of Efficiency

The Roseland Sand and Gravel Co. operates this plant, which is controlled by the Jahncke Service, Inc., at Roseland, Louisiana. Many special features of equipment and operation are most interesting

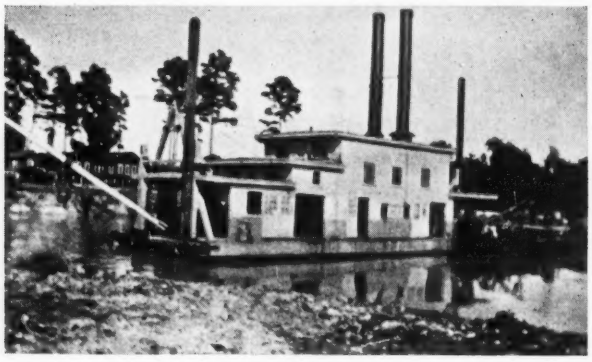
WITH a total daily capacity among its various plants of 22,000 tons per day, the name of Jahncke, of New Orleans, is synonymous with sand and gravel throughout Louisiana and Mississippi. The Roseland Sand and Gravel Co. of Roseland, La., operates this plant, which is a holding of Jahncke Service Inc. At present the plant produces 50 cars of sand and gravel daily. The plant and property are located on the Tangipahoa river, 70 miles from New Orleans, on the Illinois Central railroad, and consists of about 300 acres of timber land.

This plant produces five grades of gravel and three grades of sand, as follows: General construction gravel, 1½ to ¾ in. and 1 to ⅝ in.; roofing gravel, ¾ to ½ in. and ⅝ to ¼ in.; pea gravel, ⅜ to 3/32 in., and mason, concrete and topping sand.

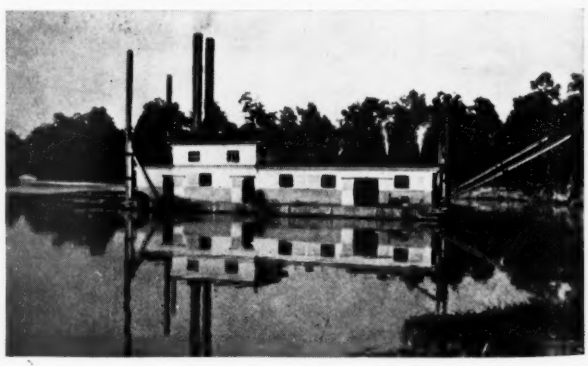
The material is supplied by two dredges, the "Capt. Davis" and the "Tangipahoa." Both boats are constructed entirely of wood and equipped with 10-in. Amsco pumps with a 10-in. discharge. The "Capt. Davis" is a 100x 40x6-ft. boat equipped with two oil-fired, 150-hp. Ames boilers. The pump is driven by a 200-hp. Buckeye engine, belt-connected. The suction pipe is 40 ft. long, including the nozzle, and is connected by a bellows joint to the pump. It is supported by a boom attached to an



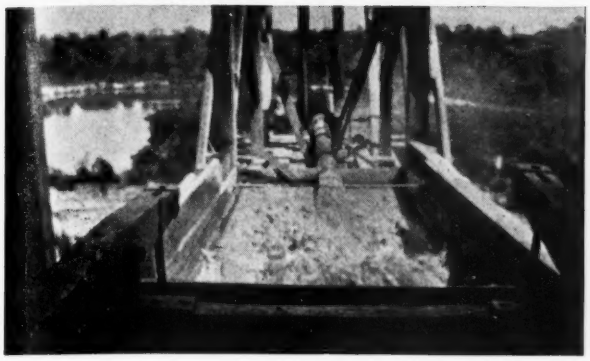
The sand is carried back with the water to the lake, where it fills in behind the dredges as they work forward. The pipe for road material is shown in the center



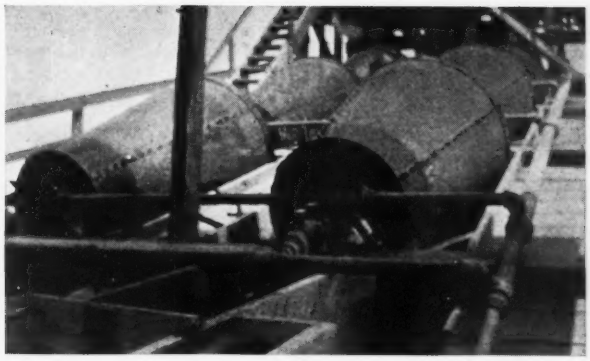
The "Tangipahoa"



The "Capt. Davis"



Discharge from elevator pipe to tank at screen head. The overflow returns to the sump, the material to the revolving screens



Two 2-in. water streams pumped from the river wash the gravel

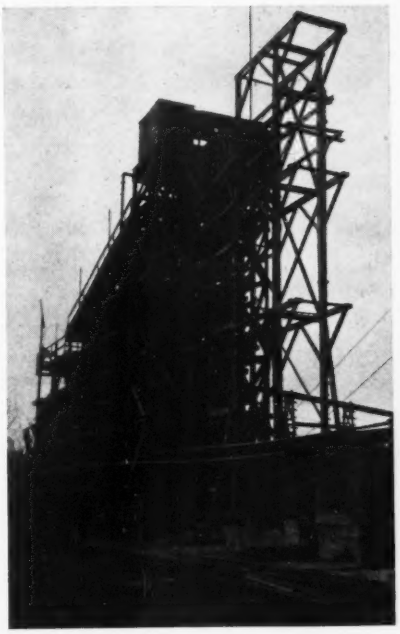
A-frame on the dredge. There is another boom equipped with a wire rope and grappling hook for pulling roots and small tree stumps. As the suction pipe cuts into the bank and the stumps are loosened from the earth, they are pulled out and deposited in the lake behind the boat where they are eventually covered by the discharge sand from the plant. The material is pumped through 1400 ft. of 10-in. pipe to the screening plant.

The "Tangipahoa" is an 80x30x6-ft. boat having a 175-hp. Morris engine, direct-connected to the 10-in. Amsco pump. Two 125-hp. oil-fired Ames boilers are used on this boat. The suction pipe is the same as on the "Capt. Davis" and the gravel is pumped 1200 ft. to the screening plant. Each boat is equipped with three 45-ft. spuds, mechanically operated. Two men handle the entire operation on each boat; one in charge of the boiler and engine room and the other the dredging operation.

The only overburden removed is the timber, the average amount of clay being such that it is more economical to handle it through the pumps.

A small sawmill has been constructed on the property and the timber is sawed into conveniently sized lumber which is used for repair work around the plant. The mill has a capacity of 10,000 ft. per day so that the lumber obtained from considerable clearing can be handled in a short time. The gravel is from 15 to 40 ft. deep over the entire area.

The two 10-in. pipe lines from the dredges discharge over a steel grizzly into a 30x10x10-ft. concrete sump. All material over 2 in. is retained on the grizzly. A 10-in. Amsco pump lifts the gravel vertically through 55 ft. of 10-in. pipe into another tank 20x10x10 ft., which is in the top of the plant at the head of the screens. This pipe, which has stood for two years without attention, is used to replace bucket conveyors. A 10-in. discharge pipe, located about a foot from the top at the end of the tank, takes the overflow back into the sump. Returning this water to the sump keeps it always full of water and the gravel well agitated.



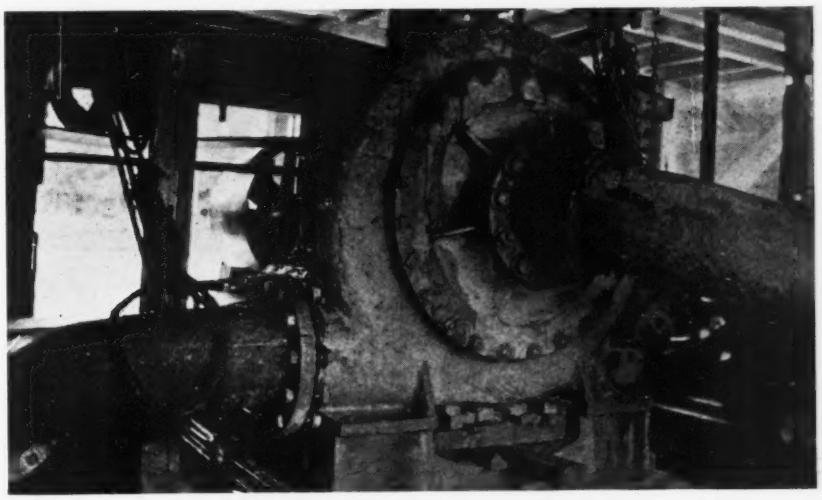
End view of the plant showing the vertical pipe through which the material is pumped from the sump to the tank at the head of the screens

The 10-in. pump is belt-connected to a 175-hp. Houstin, Gamble & Stanwood engine. The washing water in the screening plant is pumped 600 ft. from the Tangipahoa river by two 6-in. double-stage centrifugal pumps, belt-connected to a No. 8 Jewel 75-hp. engine. Two 150-hp. oil-fired Brownwell return tube boilers complete the power equipment of the screening plant.

The Screening Plant

Two 10-in pipes carry the material from the tank to the two sets of revolving screens. The six Dull conical screens are 36x72x96 in. Power for the screens is obtained from a small upright steam engine at the top of the plant, chain-connected to a shaft operating on beveled gears on the screen shafts. A flume takes the discharge from both sets of screens over two sets of flat screens in order to give a more thorough wash and to obtain a more uniform grade of pea gravel.

The material from the conical screens discharges into an interchangeable series



The 10-in. Amsco pipe used on the "Capt. Davis"

of troughs. By this system, various sizes of gravel can be loaded into any of the five bins. By replacing trough doors with screens, any percentage of two or more sizes of gravel may be had in one bin.

A very interesting feature of the sand hopper is the partition arrangement for obtaining mason, concrete, and topping sand in the one tank. After all gravel has been removed the water goes to a wooden sand hopper or settling tank. This tank has two partitions dividing it into three separate bins, the first two sections being covered with screens for the selection of mason and concrete sand respectively. The small pebbles pass on over and settle in the third section of the hopper. If topping gravel is desired, the screen from the concrete sand bin is replaced by a small gravel screen which permits a mixture of 40 per cent pebbles and 60 per cent sand to settle in that hopper. The entire hopper bin is directly over the railroad track, so that the cars are loaded from the bottom of each bin, which is equipped with a flap valve operated by a bar from the side of the hopper trestle.

If it is desired to run gravel for road material, the discharge line from one of the dredges is connected to a 65 ft. 10-in. pipe which delivers the material to a separate unit of the plant. Here it passes over one flat screen and directly into the bin where it is loaded into cars on both sides of the plant.

From the dredges the material is discharged over a grizzly into a concrete sump, then pumped vertically 55 ft. to a tank at the head of the screens

Adding a Booster Pump

In order to operate the entire 300 acres, the boats are gradually reaching a distance from the plant which makes transportation of the material more difficult. To overcome this, the company is building a new boat to serve as a booster. This boat is to be equipped with a 12-in. Amsco pump, direct-connected to a 250-hp. variable-speed Allis-Chalmers motor and will handle the material from both dredges. The material will be pumped into the lake directly in front of the booster boat, which in turn will pump it to the screening plant. This operation, besides serving as a booster for transporting the material, will also serve as an important step in the washing operations. All trash, roots, and clay will be carried by the lake current to the river, the booster taking only the heavier sand and gravel.

In Louisiana there is no real market for sand; it is usually considered a waste product and the various grades are washed and shipped only as orders are received. At other times, the sand is carried on through the plant and returned with the waste water through a large flume to the lake. In this manner, that part of the lake behind the boats is gradually filled in as the dredges work forward.

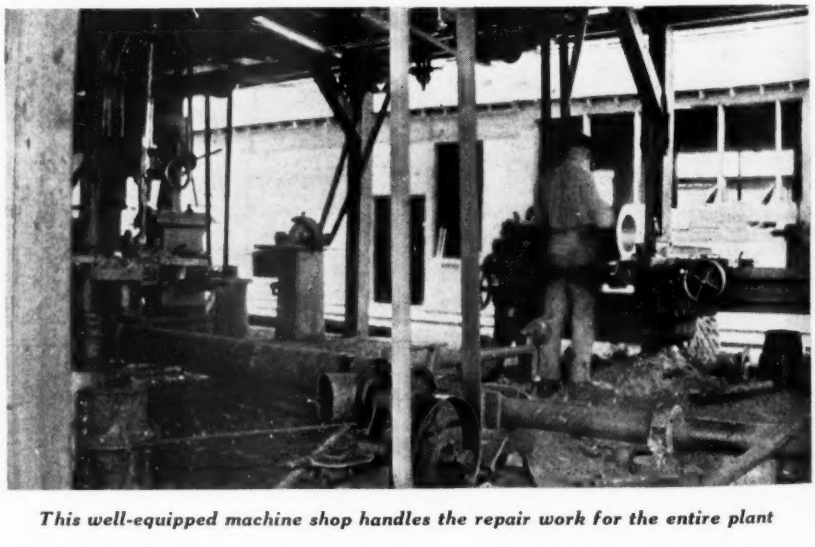
Making Quick Repairs

One special feature of the Roseland plant is the blacksmith and machine shop. As time is an essential factor in repairing equipment, the company has installed a complete blacksmith and machine shop equipped with a pipe machine, forge, anvil, lathe, drill press, shaper, power saw, and acetylene welding outfit. Power from a 10-hp. Fairbanks-Morse gasoline for operating the machine shop is obtained engine.

Besides the facilities for loading from the sand hopper, the screening plant is equipped with 12 loading spouts. A half-mile spur connects with the main line of the Illinois Central railroad, on which the cars are loaded from both sides of the plant and spotted by gravity. The track capacity is sufficient for storing 25 empty cars on each side of the plant.

While the operations of the Jahncke Service Inc. include the largest drydock and shipbuilding yards in the South, its sand and gravel business is one of its important factors. It has been producing sand and gravel for over 50 years and is now operating five plants in Louisiana and Mississippi.

While the Roseland plant is by no means the largest producer, it is a model of efficiency—the result of many years of study and experience. The Brookhaven plant, at Brookhaven, Miss., is the largest of the Jahncke plants, having a maximum capacity of 450 cars per day.



This well-equipped machine shop handles the repair work for the entire plant

Paul Jahncke, vice-president, has direct charge of the sand and gravel business, and Capt. Charles d'Aquin is general superintendent of all plants of the companys. Charles Muller is superintendent of the Roseland plant.

Forward in the Lime Industry

AS a result of the special convention of the National Lime Association held in Chicago, September 20 and 21, the lime industry of the country should start on a new upward swing with renewed impulse. The increase in output for the chemical industries has been more than satisfactory in the past few years, and lime producers have taken the stand that definite steps must be taken to increase the demand for construction and agricultural lime.

At the Cleveland convention of the association in June tentative plans for the upbuilding of the lime industry were proposed, and following this convention W. R. Phillips, general manager of the National Lime Association, visited every section of the country and discussed with lime manufacturers in small groups the details of the proposed plan. This trip covered 10,000 miles of territory, and every lime producer, both members and non-members of the association, with whom Mr. Phillips talked favored an enlarged plan of promotional work.

The special convention in Chicago was called for the purpose of ratifying plans and discussing details of the needs of the lime industry as a whole and in various sections.

The convention was unanimous in its support of a greatly enlarged budget for educational, research and promotional purposes. The method of operating will vary somewhat in various sections of the country, depending on the local needs. Investigational work and the development of new products, together with more active and intensive field work for the promotion of lime in its various uses, covers in a general way the proposed activities.

A reorganization of the National Lime Association, with the formation of three divisions covering the entire United States for administration of association work, was proposed and adopted. A district manager in each division will direct the development work in that division under the general manager of the association. There will be a general manager in charge of all association work with enlarged technical staffs devoted to construction, chemical and agricultural research work for the better knowledge and education of the consuming public.

Laboratories of the association will be greatly enlarged and new ones established at various cities to supplement the ones at Washington. These laboratories will be maintained for the free use of all lime consumers in working out their problems and in developing new products.

The Eastern division headquarters, as well as national headquarters, will be established in Washington, and Henry M. Camp will be Eastern division manager. Headquarters for the Central division will be located at Chicago, but a division manager has not yet been selected, and in the Western division neither a headquarters location nor a manager has been selected.

Between Eastern and Central divisions the boundaries are the western boundaries of New York, Pennsylvania, West Virginia, Tennessee and Mississippi. The Western division is bounded by the eastern boundaries of Montana, Wyoming, Colorado and New Mexico.

The producers at the special convention which took this step ahead for the lime industry follow:

H. F. Mengden, Dittlinger Lime Co., New Braunfels, Texas.
H. B. Mathews, Jr., Mississippi Lime and Material Co., Alton, Ill.
C. H. Kammann, Ste. Genevieve Lime Co., St. Louis.
W. S. Fitzroy, Hunkins, Willis Lime & Cement Co., and Peerless White Lime Co., St. Louis.
B. L. McNulty, Lehigh Lime Co., Chicago.
F. H. Belden, Marblehead Lime Co., Chicago.
Alfred Frerk, Standard Lime and Stone Co., Fond du Lac, Wis.
James Fryer, secretary Wisconsin Lime Manufacturers' Association, Chicago.
F. W. Zorn, National Mortar & Supply Co., Gibsonburg, Ohio.
William F. Stolzenbach, National Mortar & Supply Co., Pittsburgh.
Thomas Brisch, Rockwell Lime Co., Chicago.
B. B. Williams, Marblehead Lime Co., Chicago.
George W. Nast, Western Lime & Cement Co., Milwaukee.
W. J. Stewart, Marblehead Lime Co., Kansas City, Mo.
L. M. Palmer, Palmer Lime and Cement Co., New York.
W. C. Carson, Riverton Lime Co., Riverton, Va.
B. Breman, Valders Lime and Stone Co., Valders, Wis.
C. S. Owens, John D. Owens & Son Co., Marion, Ohio.
E. P. Smith, Limestone Products Co., Menominee, Mich.
E. G. Baker, Ohio Hydrate and Supply Co., Woodville, Ohio.
J. K. Barbour, Washington Building Lime Co., Buckeyestown, Md.
Burton K. Harris, Saylesville, R. I.
George Nicholson, vice-president National Lime Association, and White Marble Lime Co., Manistique, Mich.
George T. Weigart, Arkansas Lime Co., Ruddles, Ark.
Warner Moore, Moore Lime Co., Richmond, Va.
T. J. McGrath, Kelley Island Lime and Transportation Co., Chicago.
Charles C. Bye, Charles Warner Co., Wilmington, Del.
F. C. Cheney, Cheney Lime Co., Allgood, Ala.
G. H. Faist, Woodville Lime Products Co., Toledo, Ohio.
Charles Warner, president, National Lime Association, and Charles Warner Co., Wilmington, Del.
C. W. S. Cobb, Glencoe Lime and Cement Co., St. Louis, Mo.
P. J. Hendrick, Northern Lime and Stone Co., Petoskey, Mich.
E. L. Osborne, Ladd Lime and Stone Co., Cartersville, Ga.
J. W. Grimes, Blue Ridge Lime Co., Asheville, N. C.
Fred Witmer, Ohio Hydrate and Supply Co., Woodville, Ohio.
E. C. Swessinger, Kelley Island Lime and Transportation Co., Cleveland, Ohio.
R. P. Wilton, Steacy & Wilton Co., Wrightsville, Pa.
J. J. Urschel, Woodville Lime Co., Toledo, Ohio.
William H. Moores, The Moores Lime Co., Springfield, Ohio.
H. W. Owens, Northwestern Bureau National Lime Association, Oshkosh, Mich.
J. M. Gager, Gager Lime Co., Chattanooga, Tenn.
C. O. Dowdell, Central Bureau National Lime Association, Quincy, Ill.
R. C. Brown, Western Lime Co., Oshkosh, Mich.
R. C. Brown, Western Lime Co., Oshkosh, Wis.
T. P. Black, Black White Lime Co., Quincy, Ill.
F. M. Pinnegar, Kelley Island Lime and Transportation Co., Cleveland, Ohio.
J. F. Pollock, Ash Grove Lime and Cement Co., Kansas City, Mo.
H. M. Camp, Eastern Bureau National Lime Association, Washington.
W. R. Phillips, general manager, National Lime Association, Washington.
E. R. Stapleton, Tidewater Portland Cement Co., Baltimore, Md.

Magnesite Duties Passed

DUTIES on magnesite products on the final tariff bill were set at $6.25 a ton on crude magnesite, $12.50 a ton on caustic calcined magnesite, and $11.50 a ton on dead burned and grain magnesite. With the executive authority to vary these figures within limits and with prices of foreign materials and domestic freight rates all entering the situation, it is difficult to predict just what effect these duties will have on the domestic magnesite industry.

American Potash Now Up to Purity Standard

AMERICAN potash is now of a degree of purity well within the standard set by the United States Department of Agriculture, according to a statement by the Bureau of Soils.

The department has followed closely the course of American potash production, not only with a view to assisting in establishing commercial sources of potash but also to maintaining a quality that would be suitable for use as fertilizer without fear of injury to crops. During the summer of 1919, the attention of the department was directed to injury to crops by the use of fertilizers. The injury was widespread and serious especially to the tobacco and cotton crops of the Eastern districts of North and South Carolina and to the Maine potato crop.

The discovery of the ill effects of borax led the department to issue an order limiting the amount of borax that could be present in a mixed fertilizer, unless specifically labeled, to an amount that would be equivalent to not more than 2 lb. per acre in the applications used by the growers. The department also forbade the sale to farmers, as straight goods, of potash salts containing more than ½ of 1 per cent of anhydrous borax.

As originally obtained by the producers, the potash salts which were the cause of crop injury ranged in content of borax from 4 to 14 per cent. Immediate steps were taken to improve the methods of recovery and to eliminate the borax as far as practicable. The results of the refinement of methods show that it is practicable to produce potash salts from the Searles Lake brine with a borax content well within the limit of safety set by the department. Analyses show that in the salts produced during the period 1920 to 1922 the borax content ranged from 0.27 to 0.50 per cent, which compares favorably with the content of borax in sodium nitrate.—*Chemical & Metallurgical Engineering.*

Hints and Helps for Superintendents

New Method for Testing Sand-Lime Brick

AT the plant of the Belt-Line Brick Co., near Minneapolis, Minn., a rather novel method is employed for testing the comparative fire-resisting qualities of sand-lime brick and clay brick.

As the accompanying picture shows, it is a three-walled arrangement, with sand-lime brick and clay brick laid adjacent to each other. A fire is built in this test pit and allowed to become very hot. Then water is squirted on the brick and the fire is put out. The sudden change in temperature has a severe effect upon the brick; its tendency is to crumble. In this test it has been found that the sand-lime brick stands up a great deal better than clay brick.

Testing sand-lime brick by fire at the plant of the Belt-Line Brick Co.

A System Which Eliminates Waste in Blasting

QUARRYMEN are realizing more and more, declares the Hercules Powder Co., that "methods of attack, carefully thought out in advance, increase dividends. One of the largest stone companies in the country, operating more than a dozen quarries, plans its work almost a year in advance.

"Officials of the company make a tour of inspection in the late winter or early spring and decide how each of their quarries can be worked to best advantage during the year. They are followed by an engineer who, by careful surveys, lays out the drill holes. Of course the quarry superintendents are consulted, but the work is laid out from the standpoint of the company's operations as a whole.

"The same is true of the blasting. All the large shots are fired under the supervision of a chief blaster. The varied experience gained by this man at the different operations enables him to keep the blasting cost at a lower figure than would be possible if a different man were in charge of the blasting at each quarry. The results obtained by this one company are conclusive proof of the necessity for careful plans properly carried out in order to maintain low production costs. No operation is too small to profit by this principle."

An Effective Car Puller

AT the plant of the Ottumwa Sand Co., Ottumwa, Iowa, a car puller is used. That may not be unusual, but it is so effective as to be worthy of mention. The car puller consists of a two-drum American Hoist and Derrick Co. electrically driven hoist. The drums are 14 in. in size. The rear drum has a ¾-in. cable and is known as the pull cable. The front drum has ½-in. cable and is known as the pullback cable. The ¾-in. cable extends to a distance of 300 ft., goes around a sheave and comes 300 ft. back, making 600 ft. of pull cable. At the end of the 600 ft. the ½ in. cable is attached to the ¾-in. cable and onto this is attached another cable 300 ft. long, on the end of which is a hook which is attached to the cars to be moved.

Thus, if it is desired to move a car from plant to storage (see accompanying illustration) the ¾-in. cable does the work. On the other hand, if it is desired to spot a car to the plant, the ½-in. cable is attached to the hook and the pullback cable does the work. In other words, the hoist pulls forward or pulls back.

A car puller that pulls both forward and back

Track Device Detects Loose Wheels

AT the Stotesbury, W. Va., mines an ingenious track device has been designed which detects wheels having too much play and which sounds an alarm when they are found. According to *Coal Age*, no one is required to give time to inspection, as the action is automatic and each car is inspected every time it passes over the empty track at the tipple.

Every car that passes over the device is made to sound an alarm if the wheels under test do not continue within the limits of the track gage. One of the tipple men will hear the alarm and the car is then run onto the track leading to the shop. With the following description and the illustration shown it is possible for the blacksmith to fabricate the rail of which the device is composed.

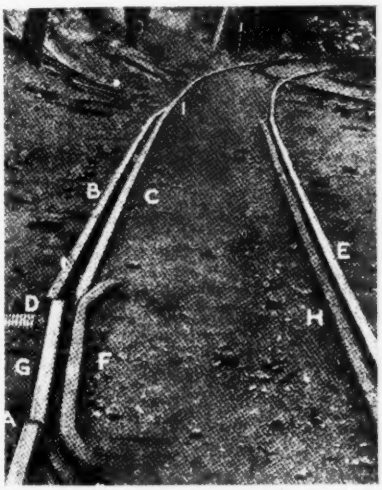
The entire length of the detecting track is no greater than that of the standard rail —about 30 ft. This rail length is inserted on the empty or return track leading from the tipple so that the cars pass through it by gravity. In the illustration will be seen the 4-ft. latch rail *G*, fishplated loosely at one end, *A*, so that it may be thrown in line with either of the two rails, *B* or *C*, on the left. A detention spring, *D*, on the forward end of the latch holds it in line with the outer rail, *B*.

Rail *C* is in gage with rail *E*, but the guide rail *F*, attached to the latch rail, *G*, will not permit the passage of a left-hand wheel over rail *C* until the latch is swept from the normal position to one in which rail *G* is in line with rail *C*. This is ac-

complished against the tension of the spring at *D*.

The right-hand wheel is pulled by the guide rail *F* toward rail *H* until the flange of the wheel comes into contact with it. In this position the flanges of the wheels on either side rub the two guide rails *F* and *H*, and only a small width of the tread on each wheel rides upon the rails *G* and *E*. But as the gage between *F* and *H* increases the latch rail and its guide are pulled into gage against the tension of the spring until the latch lines up with *C*, thus permitting the left wheel to pass over it and out to the point where the trip is made up.

If one of the loose wheels is free to increase the gage between the wheels when passing through this track, the latch will not be thrown, and the wheels will ride



Device for detecting loose wheels

upon rails *B* and *E* instead of *C* and *E*. On the ball of rail *B* are welded vertical offsets or humps about ½-in. high. These make the car bump up and down when a wheel passes over them, and this is a signal to the tipple men that a defective car is passing. At point *I* is a small latch loosely fishplated so that wheels riding either on rails *B* or *C* may pass this point.

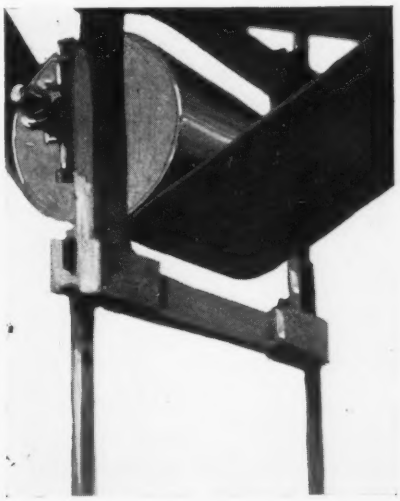
The entire length of the rail on the right-hand side is fishplated and secured to the ties in the ordinary manner and is paralleled by the inner guide rail, which is bolted to it and held 2 in. away from it by separating collars through which the bolts pass.

The double rail on the right acts as a raceway, holding the flanges of the right-hand wheels against the inner guide rail. The tension spring at *D* should be strong enough only to pull back the latch to the position shown, after a normal car has passed. A spring with a tension of about 30 lb. should do this work.

The blacksmithing job is easy, and the cost complete nominal. The saving made by detecting a loose wheel before it causes a smashup at frogs and switches will repay the expenditure.

Effective Take-up Pulley

A TAKE-UP pulley for conveyor belts can be made very easily, and at little cost, by filling the pulley with concrete. It is advisable to place the shaft in the pulley before pouring the concrete so as to insure greater rigidity. The pulley is then mounted on bearings which slide freely on vertical guide-rods that keep the belt at proper tension at all times. The two illustrations show both the old and the new method.



Close view of cement filled pulley. Note the clean-cut appearance caused by absence of miscellaneous weights

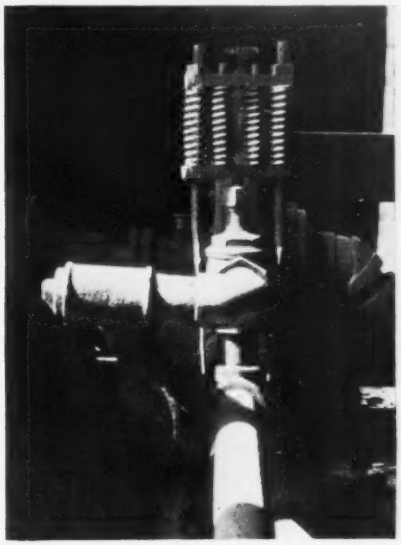
This view is typical of the old method

W. H. Crabbe of the Rockdale plant of the Chicago Gravel Co. is the man directly responsible for this idea.

Convert the Old Valves into Safety Valves

IT HAS been the custom heretofore to throw into the scrap pile valves with wornout stem threads.

G. E. Singletary, of the Plainfield, Ill., plant of the Chicago Gravel Co., found that a dependable safety-valve could be made from such a valve by removing the hand wheel and applying a clamp with two cross members, between which should be inserted springs. The pressure necessary to release



A home-made, dependable safety valve

the valve may be regulated by loosening or tightening the nuts. The accompanying photograph gives an idea as to how this home-made arrangement is assembled.

"Gypsum Is Rock"

GYPSUM is rock in Montana and not mineral, according to the Montana railroad commission in ruling on an application by the Northern Pacific railroad for permission to publish a rate of 5 cents per 100 lb. on gypsum in carload lots from Danmor, Mont., to the plant of the Three Forks Portland Cement Co., Trident, Mont.

The order fixes gypsum as taking the same rate as gravel and crushed rock instead of the class E rate, which is applied to minerals. The commission found that in some instances the Northern Pacific had charged 96 cents per 100 lb. on some movements from Danmor to Trident. The order fixes 2½ cents on carloads, with a minimum of 80,000 lb. for such shipments.

Putting Waste Heat to Work

Reducing the coal consumption of cement plants through properly designed waste heat installations is recognized as one of the most important cement plant developments of the present day. This article by H. B. Smith, a waste heat expert of Babcock & Wilcox, is based on a recent talk before the Bethlehem Section of the A. S. M. E.

GENERALLY speaking, there are three classes, or designs, of the Babcock and Wilcox boiler for waste heat work. These are the 18-high, 3-pass, the 24-high, 3-pass and 27-high, single pass.

The 18-high boilers are ordinarily offered for such types of industrial furnaces as require a comparatively high draft for their operation, this draft varying from 1½ to 2½ in. water column. The 24-high, 3-pass boilers are ordinarily offered for furnaces requiring a draft of 1 in. water column or less. The 27-high, single-pass boilers are offered where the draft requirements of the primary furnace are very low, and where such requirements and the frictional loss through the boiler can be met with a natural draft stack. Further, such boilers are offered where a direct connection to the primary furnace is possible. The single-pass boiler is not, strictly speaking, of the modern waste heat design. Such boilers, however, have their special field.

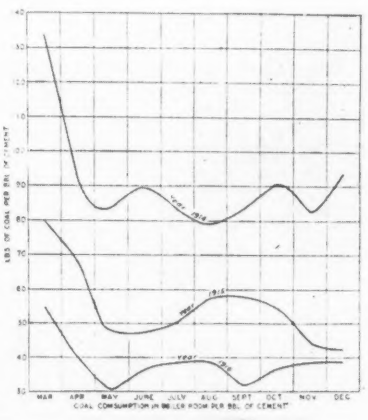
The Boiler Manufacturer's Standpoint

The sole function of a direct-fired boiler unit is the production of steam. While from the boiler manufacturer's standpoint the generation of steam is the most important function of a waste-heat unit, the users of such boilers ordinarily, and probably rightly, look upon the net steam output as a by-product, and to them the proper operation of the furnace to which the boiler is attached is of primary importance. As a matter of fact, the net steam output from a properly designed waste-heat boiler installation is largely dependent on the operation and care given the primary furnace.

Flues and Calves

The flues and valves connecting the furnace and the waste-heat boiler must be of such construction that the air infiltration and radiation may be kept at a minimum. As a rule, very little difficulty is found with radiation losses, but the air infiltration in every plant is, without exception, a difficult problem. Of course, it is possible to install a fan and fan turbine of sufficient size and capacity to overcome all of the air infiltration, but if this is done the net steam output of the installation may be reduced to such a point that the return, when figured in dollars and cents, will not warrant the investment.

Draft and the resistance of the gases passing through a boiler are two of the important factors in waste-heat installation design. The draft loss is a function of two factors, the loss due to frictional resistance and the loss due to the passage of gases over and under the baffles. To obtain the greatest net amount of steam from the boiler, the draft required at the entrance to the boiler and the draft loss through the boiler should be so proportioned that when a steam turbine of minimum water rate for this class of machine is used to drive the fan, the exhaust steam from this turbine will not be greater than can be absorbed by the water in heating all the water consumed by the boiler to 210 deg. F. With such an arrangement there is a thermal loss which, when expressed in boiler-horse-power, will be approximately 2 per cent of that generated by the boiler.



Coal consumption in boiler room per barrel of cement

The diagram shows the simplest form of Babcock and Wilcox waste-heat boiler that is offered. It is of the single-pass short-tube type usually 9 to 11 ft. in length and 27 tubes high, with a stack on top of the boiler setting. This type is particularly applicable to furnaces requiring a low draft for operation and high-gas temperatures as the gases leave the furnace. By high-gas temperature is meant the temperature considerably in excess of that encountered in open-hearth and cement work, yet below that encountered in coal and oil-fired furnaces. It does not follow, however, that such a boiler could not be used with temperatures of from 2,500 to 3,000 deg., for with these temperatures and the very low draft required, the boiler would show a high efficiency. As a matter of fact, the higher the temperature of the gases entering the boiler, the higher will be the efficiency of this boiler.

The arrangement of heating surface is such that there is a very low draft resistance and, further, this arrangement is such that the boiler in itself serves as a stack. In other words, if there were no stack on top of the boiler setting there would be a draft from probably .05 in. to 1 in. in the furnace from this boiler, with gases entering it at 1,800 deg. or above.

This type was developed many years ago for waste-heat purposes and a large number of such boilers installed. It was looked upon as an efficient boiler for the purpose for which it was designed, but the change in operating conditions, in the furnaces, and so forth, to which it was attached, caused it to become less satisfactory and for quite a considerable period this type of boiler practically was not used. During the past few years, however, several installations have been made under proper conditions which have resulted most satisfactorily in very economical installations.

Cement Company the Pioneers

The Louisville Cement Co. was really the pioneer in the use of the modern design of waste-heat boiler in connection with cement kilns.

The curves showing boiler room coal consumption per barrel of cement were published by H. D. Baylor, superintendent of the Louisville Cement Co., in a paper which he presented before the American Institute of Chemical Engineers in June, 1917. In this paper Mr. Baylor says:

"A study of the curves given in showing fuel consumption in the boiler room will give some idea of the fuel saving effected by utilizing this waste heat; however, it must be remembered that as yet we are utilizing only about 60 per cent of the waste

heat available at the plant under normal working conditions. In all we have six kilns, two, 100 x 7 ft.; two 125 x 8 ft.; and two, 150 x 10 ft. But we have under erection a second boiler (similar to the first,) that will be used in connection with the four smaller kilns. Before the installation of the boiler our coal consumption in the boiler room for 1914 averaged 91.7 lb. per barrel of cement. The waste-heat boiler was put into service during May, 1915, with the result that our average coal consumption for 1915 was 57.6 lb. per barrel of cement. During 1916 the boiler was operated practically full time and our average fuel in the boiler room for the year was 40.2 lb. per barrel. Hence, it can be readily seen that after the second boiler is put into service, but little power will be developed outside of the waste-heat units, it being perhaps necessary to keep two stoker-fired boilers floating on the line for emergency.

Doubling Percentage of Heat

Under the old way of kiln operation less than 40 per cent of the heat received by the kilns was actually utilized, but by using the hot clinker to heat the air for combustion, and the waste kiln gases to generate steam, our per cent of heat utilized has almost doubled, showing 67.2 per cent fuel efficiency in the combined system of kilns and waste heat boiler, and this we hope to increase to 70 per cent by reclaiming a part of the heat now lost by radiation from the kiln shell. It is but another step to reclaim a part of the heat now escaping from the stack of the waste-heat boiler—in other words, our combustion efficiency will eventually compare favorably with general boiler-room efficiency.

Summary

Summing up in a general way, the gains that have been realized utilizing waste heat are:

(a) The decrease in fuel required to burn a barrel of cement from approximately 110 lb. per barrel to less than 100 lb., this being largely due to the preheating of the air for combustion by drawing it over the hot clinker and also in having the coal feed under absolute control.

(b) An increase of general efficiency of heat absorption from 37.6 to 67.2 per cent of total heat supplied to kilns, the gain being shown in the boiler-horsepower developed without an increase in fuel consumed in kilns per barrel.

(c) The recovery of at least one-half the dust that was formerly carried out the kiln stack.

(d) Last but not least, the solution of draft control on the kilns through the use of the large induced draft fan. This alone is quite worth while, since cement engineers seldom agree as to size and shape of kiln stacks; but with the variable fan speed obtainable each authority can have just the draft that best suits his conditions.

Early in this paper Mr. Baylor gives test figures showing 1160 hp. developed from 177,700 lb. of gas entering the boiler at 1275 deg. F. and entering the fan at 426 deg. F. A heat balance from the test reported shows:

	Per Cent
Heat absorbed by the boiler	70.5
Heat carried away by the stack gas	27.6
Heat loss by radiation	1.9

Some Interesting Figures

Some interesting figures are given by the Southwestern Portland Cement Co., where there are three Babcock & Wilcox units installed. Each unit consists of 7560 sq. ft. boiler heating surface, 720 sq. ft. of superheating surface, 3750 sq. ft. economizer surface, and steel plate fan capable of handling 120,000 lb. gas under pressure of 6¾-in. water column. These three units are connected to three kilns 150 ft. long by 8 ft. in diameter.

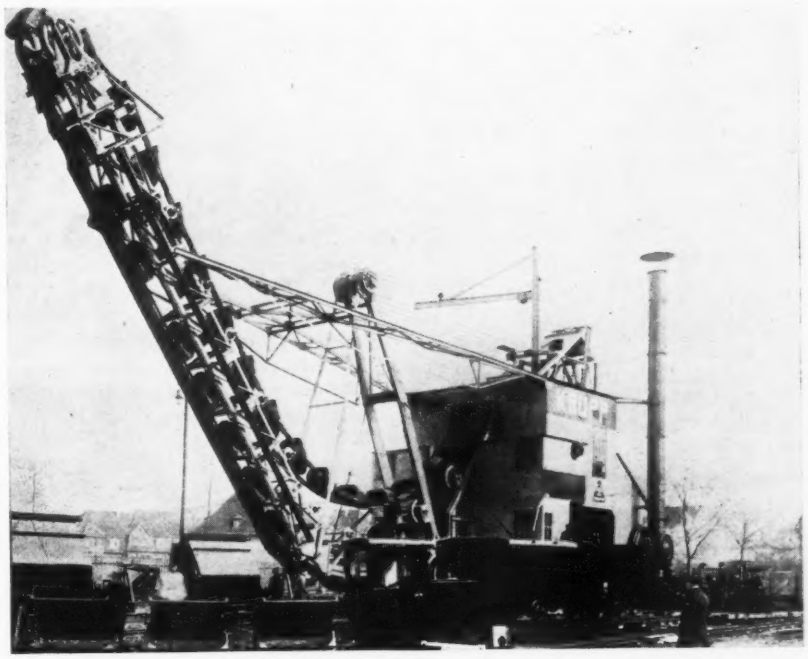
During October and November, 1920, the Southwestern Portland Cement Co. generated an average of 1,029,900 kw. while burning 52032 lb. of clinker. To generate this power they burned an average of 2409 tons of coal per month under coal-fired boilers—a rate of 4.68 lb. per kw.

During February and March, 1921, after the waste-heat boilers had been in operation 60 days, they developed an average of 1,200,791 kw. while burning 64,109 bbl. of clinker. To generate this 1,200,791 kw. they burned an average of 554 tons of coal per month under the direct-fired boilers, which was equivalent to .95 lb. coal per kw.

This shows a saving of 3.73 lb. of coal per kw., or 80 per cent, and a saving of 69.8 lb. of coal for power purposes per barrel of clinker burned.

Another "Greatest" Shovel

EVERY once in so often a "greatest" something or other looms large in the public prints, each exceeding the other in size, capacity or unusualness that the scoop shovel recently designed and constructed by the Krupps and placed on exhibition at Essen. Judging from the meager details at hand, one need not fear that it will dig a big hole in the business of our American manufacturers of rock-products machinery, although it may have its usefulness in other fields of endeavor.



The latest scoop shovel to be "placed on the market." It is of foreign design and manufacture

perhaps makes it worth while to give it mention.

Time was when the giant shovels employed in the Culebra cut of the Panama Canal amazed the public. Now comes

Federal Coal Commission a Fact

THE Congress on September 20 approved without change the administration bill creating a federal commission to investigate the coal industry with a view to stabilizing the business of mining fuel and preventing future strikes.

This compromise measure provides a disinterested inquiry body of seven members, to be appointed by the President. Its first report will be submitted by January 15, 1923. The bill, says the Chicago *Journal of Commerce* correspondent at Washington, now goes to the President for his almost certain approval.

The House refused, 153 to 128, to stipulate that the President should appoint two representatives of the operators and two spokesmen for the miners on the commission. That limitation was provided in an amendment offered by Representative London, Socialist, of New York, who would have permitted only three disinterested representatives of the public on the investigation body. Final acceptance of the conference report was by a *vive voce* vote, a request for a record vote failing to find sufficient supporters.

Essential differences between the perfected measure and that originally passed by the House were conference agreements on fixing the size of the commission at seven instead of the nine set by the House and the five preferred by the Senate. Retention of the Senate amendment to provide a separate inquiry into the bituminous and anthracite industries, as requested by Senator Pepper of Pennsylvania, after the anthracite agreement, and acceptance of the Senate change permitting the commission, if it deems it advisable, to report on the "advisability of any legislation having to do with government or private ownership, regulation or control in the coal industry."

Other matters upon which the perfected bill would direct the commission to report are:

Standardizing the mines upon the basis of their economic productive capacity and regarding the closing down of mines which, by reason of their natural limitations or other conditions fall below the standard.

Ascertaining and standardizing the cost of living for mine workers and the living conditions which must be supplied or afforded in order to surround the workmen with reasonable comforts, and standardizing also as far as practicable the amount of work a man shall perform for a reasonable wage, recognizing the value and effect of such surroundings in respect of their efficiency.

Standardizing a basis of arriving at the overhead cost of producing and distributing the coal, including delivery at the door of the consumer, recognizing in this compilation that the standardized cost of living to the miners should be the first and irreducible item of expense.

The perfected measure also inserts a fine of $5,000 or one year's imprisonment or both for any commissioner or commission employe who reveals information obtained by the body unless so ordered by a court. There also are heavy penalties for refusal to produce books, papers or to testify. Instead of the $300,000 appropriation in the House bill for expenses and the $100,000 in the Senate measure, the conferees fixed the sum at $200,000.

Fuel Oil in Making Cement

DURING the period that the shortage of coal was so seriously affecting the rock products industries, the officials of the Universal Portland Cement Co.'s Buffington plant realized that in order to maintain its efficient service it would be necessary to install oil-burning equipment. The installation was made as a temporary one only, in order to supply cement to fill contracts. Oil as a fuel for cement-making is about double the cost of coal, and now that the coal situation is becoming less acute the oil-burning equipment will be used only as long as present fuel oil stocks remain.

The installation consisted of oil storage tanks; pipe lines from tanks to kilns, and the replacing of the standard coal discharge tubes with oil-burning nozzles. By thus converting several of its kilns, the company was able to continue partial production.

The two storage tanks installed were of 11,000 gal. capacity each, sufficient to accommodate the largest types of tank cars. The tanks were placed almost directly under an unloading trestle, making possible the unloading of the cars by gravity. A 4-in. pipe line was laid from the tanks to the kilns, and a large centrifugal pump, driven by a 10-hp. motor, was installed to pump the oil from the tanks to the kilns. A 1¼-in. steam line was connected direct to the tanks to insure an easier flow of the oil.

The 4-in. oil line was tapped at each kiln and reduced to a 1-in. stream which is regulated at the nozzle. Before installing the nozzle, it was necessary to remove the discharge section of the air and coal-feeding tube and to insert instead a curved section with a connection for attaching the nozzle. The nozzle itself is the only piece of equipment of the entire system that is in the least complicated. Included in its make-up are valves which regulate the air, steam and oil pressures. The steam acts as an atomizer to the oil, which is thus blown into the kiln in the form of spray.

Because of the present price of fuel oil in its own locality, as compared to that of coal, the Universal company has found the system to be impracticable, insofar as it would mean that the cost of the finished product would necessarily be increased in proportion. It is with this thought in mind that the company is gradually doing away with the system, and as soon as its present supply of oil is exhausted all of the kilns will converted to the old system. However, once the tanks and other oil-burning equipment have been installed, it is a simple matter to change from coal to oil, or oil to coal, so that in any future emergency the company is equipped to take quick advantage of its present oil-burning installation.

Deterioration of Stored Cement

DETERIORATION of cement stored in bulk is less than in bags, owing to smaller area exposed, states the United States Bureau of Mines, as the result of an investigation to determine the cause of deterioration of portland cement during storage and transportation. Hydration takes place only at the exposed surface and the bulk of the cement is unaffected. Cement transported in bulk must be shipped in a tight, closed car and must be protected from moisture during loading, shipping and unloading. Preferably it should be used immediately after unloading at the point of destination.

This practice is now followed by several manufacturers and where conditions are suitable it is becoming more common as its advantages are seen. Shipping in bulk effects a saving by eliminating the use of bags, which is an important item in the cost of cement, and it should also permit a saving in freight rates. Details of a study of the storage and transportation of portland cement, with a bibliography on the subject, are given in Serial 2377, obtainable from the Bureau of Mines, Washington, D. C.

Du Pont Earnings in 1922

FOR the six months ended June 30, 1922, E. I. du Pont de Nemours & Co. reports net earnings of $5,346,857 after deducting all expenses, taxes, depreciation, etc. When provision had been made for $1,403,653 of bond interest and discount, and $2,137,791 for debenture stock dividends, there remained $1,805,412 available for the common stock. This was equivalent to $2.85 a share for the six-month period.

Seven Kansas Cement Companies Confess Judgment

SEVEN Kansas cement companies have agreed to pay a fine of $25,000 to the Kansas school fund and have a limited ouster order issued against them, forever prohibiting them following any of the practices charged in the original suit. The anti-trust proceedings against the cement companies were brought by Attorney-General Hopkins three years ago.

The cases have been hanging fire because of delays on the part of the court, the commissioner and the companies in furnishing the witnesses, the books and documents needed in developing the case.

The suit was brought against the Ash Grove Lime and Portland Cement Co., Bonner Portland Cement Co., Fredonia Portland Cement Co., Great Western Portland Cement Co., Lehigh Portland Cement Co., Monarch Cement Co., and the Western States Portland Cement Co.

The companies sent their attorneys to ask whether the state would be willing to accept a limited ouster which would enjoin them from doing any of the things charged in the suit. They would also submit to the supreme court continuing to hold jurisdiction over them so that at any time any company violated the ouster order a receiver could be appointed and the court take over control.

Study of Limestone Quarrying Methods

DR. OLIVER BOWLES, mineral technologist of the United States Bureau of Mines, is making a general study of the technology of limestone quarrying. Dr. Bowles recently visited a number of limestone quarries in Virginia and West Virginia for the purpose of making observations.

Our Lady "Sand and Gravel Man" Marries

YES, Miss Hazel Janet Cummins, our lady "sand and gravel man" and president, manager and principal owner of the Urbana Sand and Gravel Co., Urbana, Tex., is married. Dustin Melbourne Filler is the fortunate man. The wedding took place at Urbana on September 6.

Ask any member attending the National Association of Sand and Gravel Producers' convention at Louisville in January of last year who was the author of that epic the "Experiences of a Lady Sand and Gravel Man," read during the meeting, and he will at once declare: "Why, that was our Miss Cummins!"

In case you are one of the few who do not know Miss Cummins, you will be well repaid for turning back in your ROCK PRODUCTS' files and reading the abstracts from that really wonderful paper in our issue of January 29, 1921. It deserves the highest place in our industry's literature—it's a classic. Miss Cummins told us: "I was thrust into the business from force of circumstances. I knew no more about it than a frog does about arithmetic."

Forced to take up her late father's business—to become the man of the family—Miss Cummins bravely squared her shoulders and dug in. What harrowing experiences were hers in the beginning have been vividly depicted in the aforementioned paper. It merits reprinting and to be put in the hands of every man in the business that he may profit by her energy,

Mrs. Dustin Melbourne Filler (Miss Hazel Janet Cummins)

resourcefulness and he-man grit in meeting the thousand and one troubles that have beset the business in recent years. Today her business is a monument to her perseverance, judgment and courage.

Mrs. Filler, ROCK PRODUCTS and your many friends and admirers wish for you the greatest happiness. May your new partner jealously cherish you, for we once fellow sand and gravel men will mourn that "Miss Cummins of the Urbana" is no more. L. S.

Missouri Wants Lower Rates on Road Materials

MISSOURI's public service commission on September 14 cited all railroads of the state to appear in a hearing at Jefferson City on October 3 to show cause why the intra-state rates on all road building materials should not be reduced. The hearing will involve the rates on stone, gravel, sand, cinders and other materials used in road construction.

This citation is an indication that the commission is anxious to promote the Missouri road building program following the announcement that bids will be opened September 28 by the state highway commission for the construction of 110 miles of road under the $60,000,000 road bond issue.

Silica Increases Forbidden

IN A REPORT on I. and S. No. 1551, Silica from Southern Illinois points to Eastern cities, the I. C. C. held not justified a proposal to cancel commodity rates on silica from southern Illinois points to destinations in Eastern territory, leaving in effect the higher sixth-class rates. The proposal would have increased rates from 17 to 45 per cent, the commission said, in addition to raising the minimum from 40,000 to 50,000 lbs.

No attempt, the commission said, was made to justify the application of the class rates. Instead the carriers proposed commodity rates higher than the ones in effect May 15, and a retention of the 40,000 minimum. The points of origin are immediately north of Cairo. A typical increase would have been from 2.1 to 61 cents on traffic from the points of origin north of Cairo to Philadelphia. A compromise rate of 48.5 was proposed at the hearing.

Overrule Bedford Stone Demurrers

THE demurrers of two Bedford stone organizations and 15 affiliated companies and individuals as defendants in an anti-trust injunction suit brought by the attorney-general of Indiana last March has been overruled. It was asserted by the defendants that the complaint did not present facts justifying the conclusion that they were attempting to destroy competition or restrain trade. This overruling means that the case will be brought to trial later. The court ordered the defendants to submit answers some time during September.

Will Ship By Water

THE Gulf States Portland Cement Co., Demopolis, Ala., with a plant on the Warrior river at Spocari, Ala., is making extensive shipments of cement by water to Tuscaloosa, New Orleans, Mobile, Panama Bay, Pascagoula and other gulf and river points.

It is the intention of this company to cultivate water shipments, as it will be better able to dispose of its output in this way than when depending entirely on the railroad. At all of the principal points on the rivers and Gulf, facilities have been erected for loading and unloading freight. The Mississippi Warrior Service has suitable barges for handling cement in cloth sacks. Had it not been for the river service this company would have been obliged to close down its plant during the strike.

Cement Output in August

THE statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geological Survey, are based mainly on reports of producers of portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from two producers:

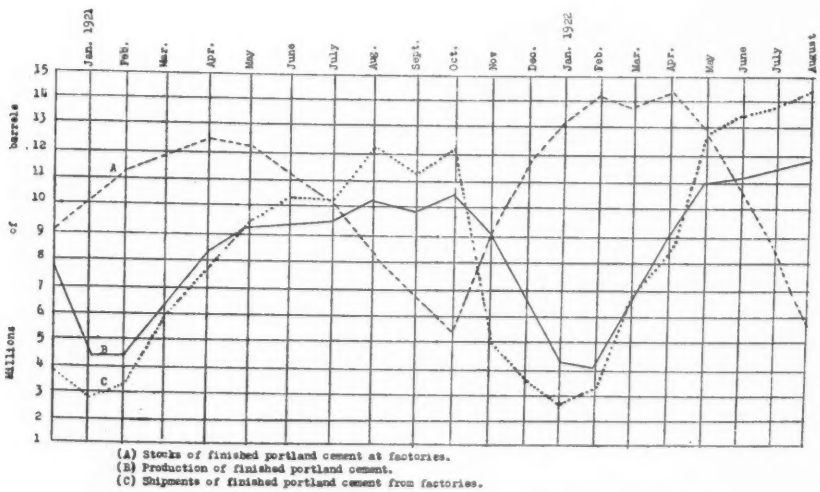
PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT IN AUGUST, 1922, AND PRECEDING MONTHS

	Production (barrels)		Shipments (barrels)		Stocks at end of month (barrels)	
Month	1921	1922	1921	1922	1921	1922
January	4,098,000	*4,291,000	2,539,000	*2,931,000	10,300,000	*13,316,000
February	4,379,000	4,278,000	3,331,000	3,285,000	11,400,000	*14,142,000
March	6,763,000	6,685,000	6,221,000	7,002,000	12,000,000	*13,848,000
First quarter	15,240,000	15,254,000	12,091,000	13,218,000	.....	.....
April	8,651,000	9,243,000	7,919,000	8,592,000	12,600,000	*14,470,000
May	9,281,000	11,176,000	9,488,000	12,749,000	12,450,000	*12,893,000
June	9,296,000	11,245,000	10,577,000	13,470,000	11,150,000	*10,718,000
Second quarter	27,228,000	31,664,000	27,984,000	34,811,000	.....	.....
July	9,568,000	11,557,000	10,301,000	13,850,000	10,414,000	*8,433,000
August	10,244,000	11,664,000	12,340,000	14,361,000	8,280,000	5,737,000
September	10,027,000	.....	11,329,000	.....	6,953,000	.....
Third quarter	29,839,000	.....	33,970,000	.....	.....	.....
October	10,506,000	.....	12,114,000	.....	5,348,000	.....
November	8,921,000	.....	5,195,000	.....	9,091,000	.....
December	6,559,000	.....	3,697,000	.....	11,938,000	.....
Fourth quarter	25,986,000	.....	21,006,000	.....	.....	.....
	98,293,000	.....	95,051,000	.....	.....	.....

*Revised.

Stocks of clinker, or unground cement, at the mills at the end of August amounted to about 2,760,000 bbl. compared with 4,833,000 bbl. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce reports that the imports of hydraulic cement in July amounted to 958 bbl., valued at $3,995. The total imports in 1921 amounted to 122,317 bbl., valued at $388,828. The imports in July were, from Canada, 951 bbl.; Sweden, 4 bbl., and Germany, 3 bbl.



(A) Stocks of finished portland cement at factories.
(B) Production of finished portland cement.
(C) Shipments of finished portland cement from factories.

Monthly fluctuations in production, shipments and stocks of finished portland cement

Indiana Asphalt and Brick Producers Form Association

THE Indiana Highway Industries Association is a new organization formed for "obtaining fair specifications and fair consideration from the state highway commission." Resolutions have been adopted asking the modification of several points of the commission's policy. Brick and asphalt construction interests are interested in the new organization.

"The association was not formed with any thought of political embarrassment to the state administration," said Secretary McKinley of the Indiana Paving Brick Manufacturers' Association. "The association does not oppose the building of concrete highways. The asphalt and brick construction interests desire only a square deal, such as they receive in other states and in the recommendations of the United States Bureau of Public Roads.

Kansas Quarries Must Pay License Tax

ROCK quarries operated in Kansas City, Kans., in the future will be subject to semi-annual license taxes, Arthur Strickland, finance commissioner, has announced. Heretofore quarries have been covered in the occupation taxes paid by contractors and have not been specifically taxed. The tax will be $15 for every six months. If a crusher is operated in connection, the tax will be $25. There are six rock quarries now being operated in the city.

Cement Company Charges Rate Discrimination

COMPLAINTS were filed on September 12 by the Portland Cement Co. of Oklahoma with the Corporation Commission alleging discrimination in rates against the Santa Fe, Orient, Katy and Fort Smith & Western roads. The company asks the commission to make an investigation and grant what relief is warranted.

The commission set September 26 for a hearing. It is also alleged that the cement company has been discriminated against relative to minimum weights in shipments.

Atlas Powder Co. Declares Dividends

A SPECIAL dividend of 3 per cent on the common stock of the Atlas Powder Co. has been declared, payable September 11 to stockholders of record at the close of business on August 31. The stock transfer books will not be closed for the payment of this dividend.

11,017 Miles of Federal-Aid Roads Built

IT IS reported by the U. S. Bureau of Public Roads that on March 31 there had been completed (since 1916) 11,017 miles of federal-aid road, the mileage of each type and the average cost per mile are given. The figures are based on a large volume of work and are the most recent and reliable figures giving average costs for the whole country. The figures cover the entire cost of construction excluding large bridges and in a few cases the cost of engineering is not included:

Type	Cost Per Mile	Miles Constructed
Graded and drained	$9,200	1,752
Sand-clay	6,850	1,338
Gravel	9,230	4,389
Water-bound macadam	14,000	294
Bituminous macadam	25,720	382
Bituminous concrete	43,500	511
Concrete	36,600	2,104
Brick	46,875	224

These figures are based on the entire period of operation of federal aid, but the major portion of the work has been done since 1918.

Accident Prevention

Crane Safety Devices and Their Uses—II

By Nicholas Prakken, Pawling and Harnischfeger Co.

Cage

The cage contains the controllers, grids, switchboard and foot levers to stop the bridge.

A new, safe location has been found for the grid resistances. They are mounted on a sub-floor of the cage. The floor of the cage is provided with trap doors so that the grid units can be inspected. The sub-floor is a more convenient place to mount the grid resistance units than upon the foot-walk; in addition, it eliminates considerable extra conduit and wiring.

The switchboard is at the back of the cage in a closed cabinet. For inspection or repairs the doors can be opened; enclosed, no casualties can arise.

In the cage is also the foot lever. For inside cranes the bridge momentum is arrested by pressing the foot on the foot lever. In outside cages the brake is normally "on"; it is released by the operator's foot when he wishes to travel. On outside cranes a runway lock is employed in the form of a curved arm that falls over a structural member bolted or riveted to the crane runway end. This lock will hold the crane securely to the runway in case of a heavy wind.

Maintenance Safety Devices

Many methods are used to keep the crane out of service during repairs. Oftentimes one or more maintenance men are busy repairing different parts of the crane. When this is the case, one side of the main line circuit has three sockets with plugs. To complete the circuit all three plugs must be in. Each one of the repairmen working on the crane keeps the plug in his pocket until his task is completed. When all three repairmen have finished, the three plugs will be in their respective sockets.

Another method is to place the main-line switch in a box and keep it locked. In case of a temporary breakdown, the maintenance man unlocks the main-line switch cabinet, opens the switch, and again locks the cabinet. When the repairs have been made, the cabinet is unlocked, the switch closed and the cabinet locked again. The crane is now ready for operation.

The ease with which repairmen can move about the crane is another item of safety. The ladder reaching from the cage to the foot-walk should be so located that the cage floor is always beneath him. This is not always possible where building clearance demands a limited space for a cage.

Transfer Cranes

The bridge of the transfer crane, so far as safety features are concerned, is the same as the standard overhead electric crane. Instead of the trolley running on the top of two girders, the cage or floor-controlled monorail electric hoist runs on the lower flange of an I-beam securely fastened to the bridge box girder and forming a part of the girder. This crane functions industrially by having this beam registering with a stationary I-beam of the same size and on the same level so the monorail hoist can leave the bridge and travel with its burden over this I-beam track, including the switches, to its destination. Provision must be made in the registering so that the beam will be in perfect alignment with the spur beam when it is desired to run off.

This baffling is usually accomplished by a baffle raised when the locking to the spur beam takes place. In case there are a series of bays in the shop and in each bay a transfer crane connected by short spurs to the adjacent bays, both ends of the spurs as well as the ends of the crane beams must have interlocking baffles and be operated from the cage of the monorail hoist. This is necessary to insure perfect alignment of both cranes so that the monorail hoist can travel safely from one crane to the other without accident.

When either two- or three-way switches are incorporated in the runway system, the spurs as well as the switch tongue must be baffled, for it is readily seen that in case a switch is partly thrown and not correctly registered, the monorail could run off the tongue between the spur beam connecting with the switch. These baffles are either of the type that drop over the sides of the I-beams or that interlock into the spur-beam web and the tongue of the switch. If the dropping type of baffle becomes bent, the monorail hoist can run underneath the baffle and off the beam so baffled. But in the interlocking type a sufficient momentum must be obtained to actually shear several square webs of cast steel.

In the past, cage-controlled monorail hoists have fallen from their runways when the king pins broke. Two good methods are employed today to prevent falling. One type is a cast-steel collar fastening the hoist and trolley together, and the other method is a cast-steel safety catch that fits around the lower flange of the monorail I-beam, but always with sufficient clearance so that it offers no friction to impede the travel of the monorail. The safety-catch type is kept clear of the flanges of the I-beam on curves by links attached to the trucks; this keeps the safety catch central with the I-beams.

Where the transfer cranes are floor-controlled, the registering and locking are done by means of pendant ropes. Then the controllers must be spring return so that the compression of the springs will return the controllers to the "off" position when the operator releases his hold on the ropes in case he trips over an object or falls.

In all transfer cranes, to hold them securely in place while at rest, the motor driving the bridge must be equipped with a strong magnetic brake. This brake is "off" only while the crane is under way and "on" always while the crane is at rest.

The greatest preventive against accidents is good judgment and care exercised by the operators and repairmen. These above safety devices have proven themselves indispensable and are being furnished as standards by most of the crane-building fraternity today.

(Concluded)

Quarried from Life

By Liman Sandrock

The Earles—Father and Son

BACK in the year 1855, in the little town of Mount Holly Vt., the February snow had banked up to the farmhouse windows, and was still falling. By the 14th the Earle homestead, on top of the mountain, was covered with snow. It was the heaviest storm within the memory of Mount Holly's people.

This particular 14th was to the Earle family a momentous date—the natal day of Horatio S. Earle, and St. Valentine, too. You oldtime boys surely remember the valentines you sent to Mary and Martha, covered with a snow-glitter that almost hid the little red farmhouse, and warmed with a tiny ray of light shooting out from the window. And then, too, that wondrous verse, "If you love me as I love you, no knife can cut our love in two."

If you appreciate this setting you can easily get the personal touch that ushered the young Horatio into this world. He was a valentine to his happy parents. For, saith the poet, "A babe in the house is a well-spring of pleasure."

But to get on with our tale.

The young Horatio's boyhood was strenuous, as Vermont farmers in the early sixties labored from sun-up to the going down thereof. He farmed a while, then worked in the woods in winter and shoveled sand on the railroad in summer. Later, he learned the molder's trade, becoming foreman, salesman, and then a manufacturer. He was even elected a state senator.

In 1882 Mr. Earle married Anna M. Keyes, a daughter of New England, and to them was born George M. Naturally, George was told that, although an average lad, he would never equal his dad, so he'd better save the midnight oil. We can't altogether agree with this prophecy, for George in due time was graduated from the Detroit University School, spent two years at the Michigan Agricultural College, and then two more at the university.

After all this "mental plowing and cultivating" he was accepted by his dad as a business partner. He sold hardware, road-building equipment, operated a gravel plant, and then went into the publishing business. In all this he was his dad's partner on the basis of the Middle West gentleman—fairness and generosity in every way.

"The greatest combination in business is that of father and son," George tells us. "With fairness in their hearts and minds the business is bound to be successful. Differences will come, but the real father is patient; he listens and counsels; and from differences carefully sifted

Horatio S. Earle

will come the 'fines' that make for success."

The Earles control the following interests: North Wayne Tool Co., established in 1835, Hallowell, Me.; Geneva Gravel Co., Earlstead, Mich., established in 1915; Good Roads Supply Co., Detroit, formed in 1908; the State Review Publishing Co., in 1905, publishing *Michigan Roads and Forests*. All these interests are successful.

Horatio Earle has done wonderful work in the development of Michigan's highways. In the public print and in the hearts of his friends he wears the proud title, "Father of Michigan's Good Roads." This is George's greatest pride.

Four grandchildren will keep the name Earle in a safe place for many years to come. The oldest enters Exeter Academy this fall for his college preparatory work and to fit him to follow in the footsteps of his forbears.

Now give heed to this wish of Horatio Earle: "Let every man take a constructive interest in his country. Dismiss hatefulness. Develop fairness in criticism. Regardless of its importance, do something for the community whereby it may grow better. Make it a worthy place for the children who must carry on the wonderful traditions handed down by those who made it possible to know this land as America."

This father-and-son combination has made a deep mark for itself in our industry, and that industry is proud of the Earles—father and son.

The Big Rock in Little Rock

Dear Liman Sandrock:

Rocked in the cradle of rockbound Arkansas is Little Rock, which supplies the rock for the Big Rock Stone Co.—the Big Rock of Little Rock. You take a rockaway at the Little Rock deppo and, riding along a rocky road, your eye is gladdened by the bluerocks flying overhead and the rockbass sporting in the river.

You'll little reck the amount of rock quarried by the Big Rock in Little Rock, where the officials rock contentedly as they bank the "rocks" made in the rock business in Little Rock.

Rockford, Ill., may be the big cheese, but Little Rock has the Big Rock.

Little Rock, Ark. WM. STONE.

They Said It!

SUPERINTENDENT JOHN BALL, Lehigh Portland Cement Co., West Coplay, Pa.: "I tell ye, boys, I would love like a brother any man who would tell me to mind my step and watch out lest I get hurt; and I'm telling every man Jack of you that the wives and babes at home look to us to see that their Jim, Mike or Bill comes back safe to them at night."

PROF. F. C. MATHERS, Indiana University: "I have always kept in mind that there is some solution to every problem. A failure simply means that the chemist has not yet found the right things to use or the correct method to follow."

A. R. HIRST, Wisconsin highway engineer: "We are sore and disgusted with the national administration, the national management of the coal and rail strikes and the perpetual period of distress which the construction industry is forced to stand always almost alone."

THE SEATTLE *Star* says that the fertilizer used by the Jap farmers is responsible for the ill health of those who have eaten their lettuce. Let us hope that they do not use the same fertilizer employed in their native Japan. It isn't lime, exactly. However, a cheery note from the Cheerylanes Co., Lewiston, Idaho, says that this matter will be investigated.

Editorial Comment

Perseverance Rewarded

Never was a better example of skilful management than that presented by the National Lime Association as it emerged from its Chicago convention of September 20 and 21. For five years, and more, a handful of far-sighted men have visualized the future possibilities of an industry founded on centuries of production of a basic world commodity—lime. But lime is a commodity of a thousand different uses and a thousand different varieties, and the problem of promoting its use must necessarily be complicated by a thousand and more factors, both known and unknown. Perhaps no manufactured commodity ever presented so difficult and complicated a subject for promotional activities.

Time and again the manufacturers of lime met and considered their problems and time and again went away with little or no apparent progress having been made; sometimes, even, factional disputes made it appear that the national association was at the point of disintegration. That real progress was made is now attested by the unanimous adoption of an aggressive and progressive policy for extending the lime trade, with funds, voluntarily contributed, sufficient to attain some important results.

To one who has followed this progress of the lime industry for five years it is inevitable to escape the conclusion that its very salvation has been due almost entirely to the perseverance of a small group of far-visioned men, headed by Charles Warner, but ably reinforced by others who might be mentioned. Had these men lost courage, or abandoned even for a short time, their efforts to reach an objective that they clearly saw from the very first, the lime industry today would never be in the position that it is to recover its lost ground. For it has lost ground, as any man intelligent enough to examine the Government statistics of the industry knows. And while the National Lime Association did not prevent and probably could not have prevented the loss of trade that has come in the last few years, its leaders have succeeded, with the limited funds and means available, in *discovering the way* to retrieve all that is lost, and in opening limitless possibilities for new fields.

However, the National Lime Association, even if it had a million dollars at its disposal, cannot develop new business or new fields unless it has the *full* support of every lime manufacturer; and by full support is meant not merely paying dues to the organization, but producing and marketing material that overcomes such obstacles as ordinary run-of-the-kiln lime never can overcome, in this day of competitive materials, accurately and scientifically manufactured.

But all the scientific and laboratory knowledge in the world is of no value to lime manufacturers other than as guide posts, and only in so far as they apply such knowledge to their own operations and their own product. Those who will get the most out of the reorganized association and its activities are those who apply quickest the useful knowledge of lime it has and will develop.

It means a revolution in the lime industry and the development of a new school of technical and scientific, as well as practical, lime-plant operators. It means that the perseverance which has developed a way to greater things must be matched by a perseverance on the part of *every* lime manufacturer to know his commodity thoroughly—its limitations as well as its its advantages.

Oil Fuel For Lime

The scarcity and high price of coal is causing many manufacturing operations to turn to fuel oil as a possible substitute. This is a matter that has already received much attention by cement manufacturers and many new oil-burning kilns have been put into operation in the past few months, especially in the East where oil fuel has never been much used before this time. In the case of cement-kiln operation the use of oil fuel presents no new problems, for cement has been burned in this way continuously for many years, particularly in the far West.

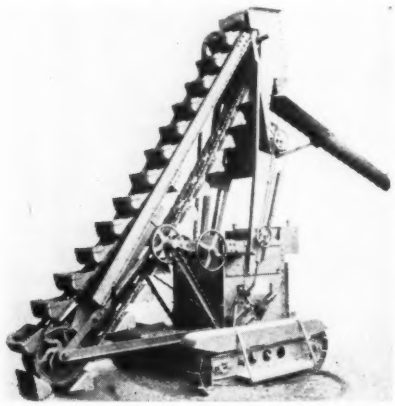
In the case of lime burning the use of fuel oil does present new problems to most manufacturers because few of them have ever had experience with oil burning and they have had little opportunity to study others' operations where oil has been used. In California crude oil has been used for many years, both in rotary and shaft lime kilns; however, the limestone of California is a crystalline high calcium limestone and experience which has been gained there could not be used unqualifiedly elsewhere.

The main thing to remember in using oil in lime burning is that it is very easy to get too intense a heat. While you can't overburn cement clinker, it is very easy to overburn a dolomitic limestone. Consequently in vaporizing the oil for burning it must be done with the injection of some steam or water vapor. But with the proper combination of oil and water vapor, those who have had experience believe that it is more easy to simulate wood-fuel burning with oil than with any other fuel.

New Machinery and Equipment

New Portable Bucket Loader

AS illustrating the rapid development of the loader, the Jeffery Mfg. Co., Columbus, Ohio, has placed on the market its latest type of portable bucket loader, known as the Tanktred. For keeping the machine more stable on rough and soft ground there is a crawler or caterpillar mounting similar to that



Showing the small space required to turn loader

used in war work, but of lighter construction and with a three-point frame support.

The buckets are of heavy malleable iron and have a steel cutting edge extending well around the bucket ends; this protects the buckets and is itself renewable. The digging edge has a cutting clearance at all points.

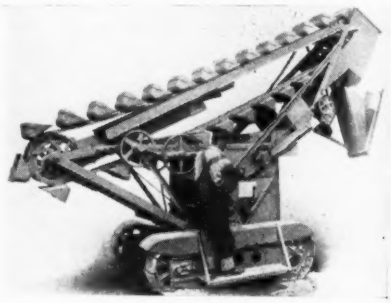
The foot of the elevator is so constructed that the buckets are wider than any other part, so that the machine can be advanced several feet into the pile with nothing but the cutting edge coming in contact with the material. It will handle reasonably hard or frozen material.

Another feature of this loader, says the manufacturer, is a large foot wheel, which, by reducing the centrifugal force, enables the buckets to pick up the material, especially the large lumps, without kicking them away. A flexible wood boom keeps the buckets digging; but it will spring sufficiently to release the buckets from overload strain when they encounter a cave-in or an obstruction.

Two speeds—a traveling speed for moving the machine from place to place and a feeding speed for driving directly into the pile—give a wide flexibility of operation. Only one man is required and he can so manage his machine that the buckets are always full. The increasing size of automobile trucks has made it necessary to raise the discharge point of these loading machines. In 1914, 7 ft. was the ordinary clearance, whereas 9 ft. or 9 ft. 6 in. is now the standard.

A universal swivel spout enables the operator to spot the material with but little change of position of either truck or loader, thus saving time and labor in spreading the load. A truck may be driven in front of the loader equipped with this device and every position of the bed may be filled without moving the truck, even if the loader in the meantime had to change position.

To increase the loading capacity by keeping the elevator at work while a full truck is being pulled away and an empty driven into place, storage hoppers have been developed, arranged to catch the discharge from the buckets and provided with a quick opening valve whereby the hopper contents can be discharged into the truck.



Elevator boom collapsed

The increasing head room and provision for various attachments supplied for these loaders have made it necessary to provide a much taller, heavier machine. To keep from being top heavy, a wider and larger wheel base and larger axles become necessary, so the 1922 machine is heavier, requires more power and has greater capacity than obtained in the 1914 loaders.

The machine is equipped with either gas or electric power.

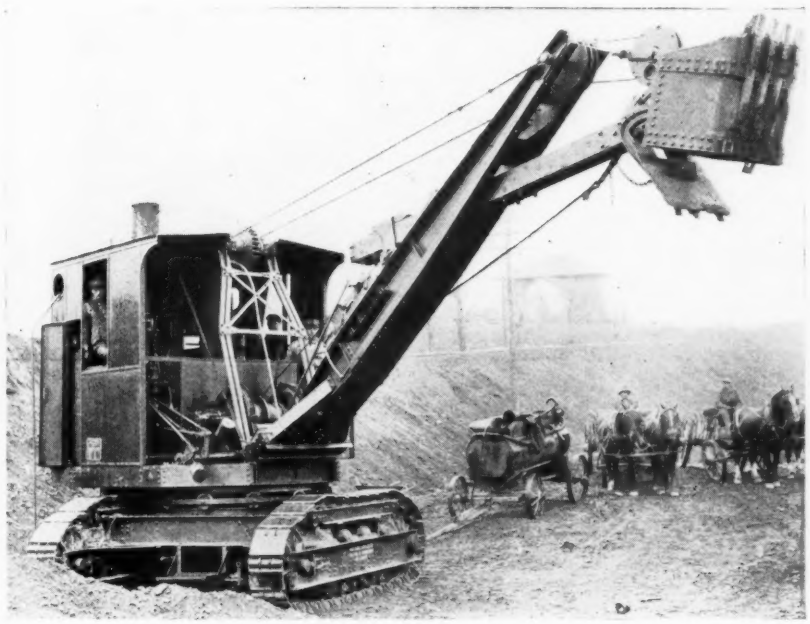
Digging operation of portable bucket loader

A New Combination Crane and Shovel

A modern combined utility machine for the contractor, supply yard, railroad or industrial plant is the improved crawling tread crane-shovel manufactured by the Orton & Steinbrenner Co., Chicago and Huntington, Ind.

This company has utilized the experience gained through successive developments and improvements to the end that the present machine is said to be the embodiment of all the better principles of design and construction. Two sizes of machines are manufactured, the ¾-yd. and the 1-yd. capacity.

The design is such that in a minimum amount of time, simply by removing the crane boom and substituting the shovel boom and dipper, the crane may be readily converted from a clamshell rig to a steam shovel. Even this is unnecessary to convert it into a skimmer for tearing up pavements.



A combination of crane and shovel

A separate boom with skimmer scoop can be connected to the crane independently of the main crane boom and the hoist line simply reeved over the scoop.

The radius of the boom may be varied to suit the conditions of the job. This feature enables it to dig several feet below the normal operating level and it also increases the lift.

Motive power is supplied by two engines only, thus simplifying operations. The hoisting, swinging and traveling operations are performed with double clutches by the main non-reversing engines, while the crowding motion of the dipper is actuated by a separate reversing engine placed midway along the boom.

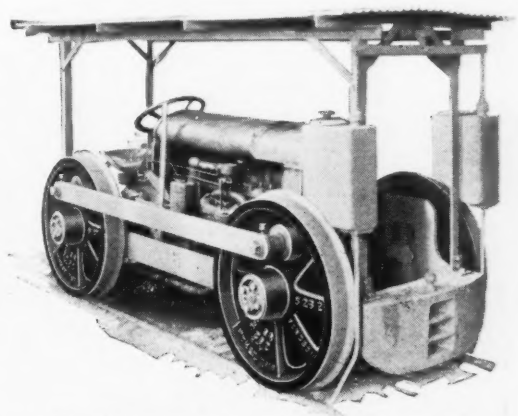
The rotating base turns on a live ring of rollers on a large diameter rail circle, thus evenly distributing the load and requiring little power to swing. The carbody is built up of structural steel shapes and plates well riveted and thoroughly reinforced. The housing is of sheet steel with ample sash and doors, arranged for removal when required. The operator has an unobstructed view of the dipper at all times.

The crawling tread is of the flexible type, adjusting itself automatically to the ground contour. The tread links are so designed that in passing around the sprocket all foreign materials adhering to them are thrown off and prevented from entering the spaces between. All the movable parts are bronze bushed and lubricated with the Alemite pressure system and the sheaves and bearings are also bronze bushed. Another feature is the accessibility of parts, especially those bearing the brunt of the wear, consequently repairs can be installed in the field with a minimum of lost time.

Industrial Tractor for Many Uses

WITH the exception of sand rigging and top, the Adamson Fordson has only 34 bolts, states the manufacturers, the Adamson Motor Co., Birmingham, Ala., in describing its product. The 1x6 frame is of solid plate steel, the bumpers of cast iron front and rear, with link and pin couplings. The rear bumper is attached to the draw-bar cap so that the pressure is put on the tractor in the place provided for it. The housings are not cut or the tractor otherwise mutilated. The different gages are taken care of in the wheels; this enables the locomotive motor to be built back into a Fordson tractor in about three hours' time.

It is advisable to operate this 3½-ton tractor so that cool air can always hit the radiator. The tractor is equipped with sand rigging in front only to prevent its being operated in reverse. It will operate economically on narrow-gage line for almost any kind of work.



Tractor for many uses operating on narrow-gage line

Slate Association Seeks Slogan

ANNOUNCEMENT has been made by the National Slate Association that it is seeking a serviceable slogan and insignia. The association, by means of a contest, offers a prize of $100 for the best slogan or catch-line, and also $100 will be given for the most significant insignia.

Further particulars of the contest may be obtained by writing to the Slate Slogan or Insignia Contest, 757 Drexel Building, Philadelphia, Pa.

Bricks from Dolomite

AT the ceramic experiment station, Columbus, Ohio, the Bureau of Mines has made standard size bricks from calcined dolomite and from raw dolomite. Calcined dolomite was found undesirable for making ingot bricks as the mud slakes so rapidly, and on account of enormous shrinkage during drying and burning, all samples cracked badly.

Raw dolomite, together with 10 per cent flux, gives excellent promise. The bricks so burned to 1450 deg. were sound, of high density and have not yet shown signs of slaking when subjected to the boiling test.

What Goes Into Paper Besides Limestone

ACCORDING to the house organ of a large paper manufacturer, 100 lb. of paper represents the following commodities in approximately the quantities indicated: Wood, 13.4 cu. ft.; sulphur, 12.7 lb.; limestone, 17.5 lb.; kerosene, 5.7 oz.; bleaching powder, 14.3 lb.; rosin, 3 lb.; soda, 0.515 lb.; alum, 4.2 lb.; color, 1.8 oz.; coal, 320 lb.; iron sulphate 0.79 oz.; copper sulphate, 0.19 oz.; lime, 3.17 oz.; and 7,500 gal. of chemically treated and filtered water.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.10	.....
Buffalo, N. Y.			1.30 per net ton all sizes			
Chaumont, N. Y.	1.00	.....	1.50	1.25	1.25	1.25
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	.....
Coldwater, N. Y.			1.50 per net ton all sizes			
Eastern Penna.	1.35	1.35	1.35	1.35	1.35	1.35
Munns, N. Y.	.75	1.15	1.15	1.15	1.15	1.15
Prospect, N. Y.	.75	1.25	1.25	1.25	1.25	.....
Walford, Pa.	.....	1.30	1.30	1.30	1.30	1.30
Western New York	.75	1.20	1.20	1.20	1.20	1.20
CENTRAL						
Alton, Ill.	1.75	.....	1.50	1.35	.....	.....
Buffalo, Iowa	.90	.....	1.20	1.00	1.05	1.05
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20	.....
Chicago, Ill.	1.30	1.70	1.30	1.30	1.30	1.30
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10
Faribault, Minn.	.....	.....	.....	.....	1.75	.....
Greencastle, Ind.	1.25	1.10	1.00	.90	.90	.90
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.50
Krause, Columbia and Valmeyer, Ill.	1.40	1.35	1.35	1.35	1.20	1.20
Lannon, Wis.	.80	.....	1.00	.85	.85	.85
Mitchell, Ind.	.80	.80	.80	.80	.80	.80
Montreal, Canada	.85	1.20	1.10	1.05	1.00	.....
Montrose, Ia.	.....	1.50	1.60	1.55	1.45	1.40
River Rouge, Mich.	1.00	1.10	1.10	1.10	1.10	1.00
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Southern Illinois	1.35	1.25	1.25	1.25	1.10	.....
Stolle, Ill. (I. C. R. R.)	1.30	.....	1.35	1.35	1.35	1.35
Stone City, Iowa	.75	.....	1.40	1.30	1.25	.....
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00
Waukesha, Wis.			Prices include 90c freight all sizes .80 per ton			
SOUTHERN:						
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15	.....
Bromide, Okla.	.75	.....	.....	1.50	1.50	.....
Cartersville, Ga.	.....	2.00	1.40	1.25	1.25	.....
Chickamauga, Tenn.	.90@1.00	.85@1.15	.....	.75@1.00	.75@1.00	.....
Dallas, Texas	1.00	1.00	1.00	1.00	1.00	1.00
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00	.....
Ft. Springs, W. Va.	1.00	1.30	1.40	1.25	1.15	.....
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45	.....
Ladds, Ga.	.....	.....	1.40	1.40	1.40	.....
Morris Spur (near Dallas) Tex.	1.00	1.25	1.25	1.25	1.25	1.00
WESTERN:						
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.20	1.65	1.65	1.55	1.45	1.40
Cape Girardeau, Mo.	1.50	.....	1.50	1.50	1.25	.....
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	.....
Branford, Conn.	.80	1.50	1.25	1.15	1.00	.....
Bound Brook, N. J.	2.00	2.30	1.90	1.50	1.40	.....
Dresser Jct., Wis.	1.00	2.25	.....	1.75	2.00	.....
Duluth, Minn.	.90@1.00	2.00@2.25	1.75@2.00	1.40@1.50	1.30@1.40	1.50
E. Summit, N. J.	2.10	2.30	2.00	1.70	1.40	.....
Eastern Massachusetts	.60	1.85	1.40	1.40	1.40	1.40
Eastern New York	.75	1.50	1.30	1.30	1.40	1.40
Eastern Pennsylvania	1.15	1.50	1.45	1.35	1.30	1.30
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60	1.35@1.45	1.15@1.25	1.05	.95@1.00	.....
Oakland, Calif.	1.75	1.75	1.75	1.75	1.75	1.75
Richmond, Calif.	.50*	.....	1.50*	1.50*	1.50*	.....
Springfield, N. J.	2.00	2.10	2.00	1.75	1.60	1.60
Westfield, Mass.	.60	1.35	1.25	1.10	1.00	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Buffalo, N. Y.—Granite	.90	.....	1.20	1.00	1.05	1.10
Berlin, Utley and Red Granite, Wis.	1.50	1.60	1.40	1.30	1.30	.....
Columbia, S. C.—Granite	.....	.....	1.75@2.00	1.75	1.60@1.75	.....
Dundas, Ont.—Limestone	1.00	1.35	1.35	1.25	1.10	1.10
Eastern Penna.—Sandstone	.85	1.55	1.55	1.40	1.35	1.30
Eastern Penna.—Quartzite	1.20	1.30	1.20	1.20	1.20	1.20
Lithonia, Ga.—Granite	1.00	2.50	2.00	1.25	1.25	1.00
Lohrville, Wis.—Cr. Granite	1.35	1.40	1.30	.....	1.20	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.50	2.00@2.50	.....	1.50
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55
Sioux Falls, S. D.—Granite	1.00	1.60	1.55	.....	1.50	.....

*Cubic yard. †Agrl. lime. ||R. R. ballast. §Flux. ‡Rip-rap, a 3-inch and less.

Agricultural Limestone

EASTERN:

Chaumont, N. Y. — Analysis, 95% $CaCO_3$, 1.14% $MgCO_3$ — Thru 100 mesh; sacks, 4.00; bulk **2.50**

Grove City, Pa. — Analysis, 94.89% $CaCO_3$, 1.50% $MgCO_3$—100% thru 20 mesh, 60% thru 100 mesh, 40% thru 200 mesh; in 80 lb. paper sacks, 4.50; bulk 3.00

Hillsville, Pa. — Analysis, 96.25% $CaCO_3$—Raw ground; sacks, 4.50; bulk 3.00

Jamesville, N. Y. — Analysis, 89.25% $CaCO_3$, 5.25% $MgCO_3$; pulverized limestone; sacks, 4.00; bulk..... 2.50

New Castle, Pa.—89% $CaCO_3$, 1.4% $MgCO_3$—75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk 3.00

Walford, Pa.—Analysis, 50% thru 100 mesh; 4.50 in paper; bulk..... 3.00

West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% $CaCO_3$—50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk.... 3.00

CENTRAL:

Alton, Ill.—Analysis, 97% $CaCO_3$, 0.1% $MgCO_3$—90% thru 100 mesh..... 7.00
50% thru 50 mesh..... 4.00

Bedford, Ind. — Analysis, 98.5% $CaCO_3$, .5% $MgCO_3$—90% thru 10 mesh 1.50

Belleville, Ont. — Analysis, 90.9% $CaCO_3$, 1.15% $MgCO_3$—45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk 2.50

Bellevue, Ohio — Analysis, 61.56% $CaCO_3$, 36.24% $MgCO_3$; ¼ in. to dust, about 20% thru 100 mesh..... 1.25

Bettendorf, Ia., and Moline, Ill.—97% $CaCO_3$, 2% $MgCO_3$—50% thru 100 mesh; 50% thru 4 mesh..... 1.25

Buffalo, Ia.—90% thru 4 mesh..... 1.00

Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.3% $MgCO_3$—50% thru 100 mesh 1.50
90% thru 4 mesh, cu. yd..... 1.35

Chicago, Ill.—Analysis, 53.63% $CaCO_3$, 37.51% $MgCO_3$—90% thru 4 mesh.... 1.00

Columbia, Ill., near East St. Louis—½-in. down ..... 1.25@1.80

Detroit, Mich.—Analysis, 88% $CaCO_3$, 7% $MgCO_3$—75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh..... 1.80@3.80

Elmhurst, Ill. — Analysis, 35.73% $CaCO_3$, 20.69% $MgCO_3$—50% thru 50 mesh 1.25

Greencastle, Ind. — Analysis, 98% $CaCO_3$—50% thru 50 mesh..... 2.00

Kansas City, Mo.—50% thru 100 mesh 1.50

Krause and Columbia, Ill.—Analysis, 90% $CaCO_3$, 90% thru 4 mesh..... 1.40

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$—90% thru 50 mesh..... 2.00

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; pulv. limestone; 70% thru 100 mesh; 60% thru 50 mesh; 100% thru 10 mesh; sacks.. 4.50
Bulk 3.00

Milltown, Ind. — Analysis, 94.41% $CaCO_3$, 2.95% $MgCO_3$—40.8% thru 100 mesh, 61.2% thru 50 mesh..... 1.40@1.50

Mitchell, Ind. — Analysis, 97.65% $CaCO_3$, 1.76% $MgCO_3$—50% thru 100 mesh..... 1.50

Montrose, Ia.—90% thru 100 mesh..... 1.25

Narlo, Ohio—Analysis 56% $CaCO_3$, 43% $MgCO_3$, limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh..... 1.50@2.00

Ohio (different points), 20% thru 100 mesh; bulk ..... 1.25@1.50
Piqua, O.—90% thru 100..... 3.25@5.00
40% thru 100..... 1.75@2.00
100% thru 4..... 1.25

River Rouge, Mich. — Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk..... .80@1.40

Stolle, Ill., near East St. Louis on I. C. R. R.—Thru ½-in. mesh..... 1.30

Stone City, Ia.—Analysis, 98% $CaCO_3$ 50% thru 100 mesh..... .75

(Continued on next page)

Agricultural Limestone

(Continued from preceding page.)

Toledo, Ohio—¼-in. to dust, 20% thru 100 mesh ..... 1..0
Waukesha, Wis.—No. 1 kiln dried..... 2.00
No. 2 Natural..... 1.75
Chasco, Ill.—Analysis, 96.12% $CaCO_3$, 2.5% $MgCO_3$—90% thru 100 mesh.... 5.00
90% thru 50 mesh..... 1.35
Yellow Springs, Ohio—Aanlysis 96.08% $CaCO_3$, 63% $MgCO_3$, 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk.... 4.25

SOUTHERN:

Alderson, W. Virginia—Analysis 90% $CaCO_3$; 90% thru 50 mesh..... 1.75
Cape Girardeau, Mo. — Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$ — 50% thru 100 mesh 2.00
90% thru 4 mesh..... 1.50
Cartersville, Ga.—Analysis, 55% $CaCO_3$, 42% $MgCO_3$—all passing 10 mesh..... 2.00
Claremont, Va.—Analysis, 92% $CaCO_3$, 2% $MgCO_3$—90% thru 100 mesh, 4.00; 50% thru 100 mesh, 3.00; 90% thru 50 mesh, 3.00; 50% thru 50 mesh, 2.75; 90% thru 4 mesh, 2.75; 50% thru 4 mesh..... 2.75
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$—90% thru 50 mesh..... 1.75
Hot Springs, N. C.—50% thru 100 mesh, sacks, 4.25; bulk..... 3.00
Knoxville, Tenn.—80% thru 100 mesh; bulk, 2.70; 100% thru 10 mesh..... 2.30
Ladds, Ga.—50% thru 50 mesh..... 2.00
Linnville Falls, N. C.—Analysis, 53% $CaCO_3$; 42% $MgCO_3$—50% thru 100 mesh; 2.50 per ton bulk, 3.50 per ton mesh 200-lb. burlap; crushed limestone, ¾ down, including dust, 1.00; 1 to ¾, 1.60; 2-in. and less..... 1.40
Mountville, Va. — Analysis, 76.60% $CaCO_3$, 22.83% $MgCO_3$—X thru 20 mesh; sacks 5.00

WESTERN:

Colton, Calif.—Analysis, 95% $CaCO_3$, 2-4% $MgCO_3$—all thru 14 mesh—bulk 4.00
Garnett, Okla.—Analysis, 80% $CaCO_3$, 3% $MgCo_3$; 50% thru 50 mesh ..... .50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk..... 1.80
Tulsa, Okla.—90% thru 4 mesh..... .50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Baltimore, Md. 2.25
Berkley Springs, W. Va..... 1.75@2.00
Cedarville and South Vineland, N. J.—Damp, 1.75; dry..... 2.25
Cheshire, Mass. ..... 5.00@10.00
Columbus, Ohio—Glass sand..... 1.50
Dunbar, Pa.—Damp 2.00
Falls Creek, Pa. 2.50
Hancock, Md.—Damp..... 1.25@1.75
Klondike and Pacific, Mo..... 1.75@2.50
Mapleton, Pa. ..... 2.00@2.25
Massillon, Ohio 3.00
Michigan City, Ind.—Glass sand..... .50@ .55
Mineral Ridge, O..... 2.50@2.75
Green 2.00
Montoursville, Pa. 1.75
Oregon, Ill.—Glass sand..... 1.25@1.75
Ottawa, Ill. ..... .75
Pittsburgh, Pa.—Dry, 4.00; damp..... 3.00
Rockwood, Mich. 2.50
Round Top, Md.—Dry..... 1.25
San Francisco, Cal..... 3.00@3.50
St. Mary's, Pa. 2.25
Thayers, Pa. 2.00
Utica, Ill. ..... 1.00@1.25
Zanesville, Ohio ..... 2.00@2.50

FOUNDRY SAND:

Albany, N. Y.—Sand blast..... 4.00
Molding fine and brass molding..... 2.00
Molding coarse 1.75
Allentown, Pa.—Core and molding fine 1.50@1.75
Arenzville, Ill.—Molding fine..... 1.40@1.60
Beach City, O. — Core, washed and screened ..... 2.00@2.50
Furnace lining ..... 2.50@3.00
Molding fine and coarse..... 2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse..... 5.00
Sand blast ..... 5.00@8.00
Stone sawing 6.00
Cleveland, O.—Molding coarse..... 1.50@2.00
Brass molding ..... 1.50@2.00
Molding fine ..... 1.50@2.25
Core ..... 1.25@1.50
Columbus, Ohio—Core ..... .40@.75
Sand blast ..... 3.50@5.00
Furnace Lining 1.75
Molding fine 2.00
Molding coarse ..... 1.25@1.75
Stone sawing 1.50
Traction ..... .75
Brass molding 2.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Attica, N. Y.	.75	.75	.75	.60	.60	.60
Ambridge and So. Heights, Pa.	1.15	1.15	1.15	1.15	.70	.70
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		.66		.90	1.00	
Farmingdale, N. J.	.48	.48	1.00	1.20	1.20	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35		1.25
Machias, N. Y.	.95	.95	1.25	.85	.85	.85
Pittsburgh, Pa.	1.15	1.15	1.15	.70	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Washington, D. C. (rewashed, river)	.75	.75	1.60	1.40	1.20	1.20
CENTRAL:						
Alton, Ill.		.85				.90
Anson, Wis.	.40	.40			.70	.70
Barton, Wis.	.60	.60	.70	.70		
Beloit, Wis.		.50			.50	
Chicago, Ill.		1.75@2.23	1.75@2.43			
Cincinnati, Ohio	.70	.65	.90	.90	.90	.90
Columbus, Ohio	.75	.75@1.00	.65@1.00	.75@1.00	.75@1.00	.75
Des Moines, Ia.	.50	.40	1.50	1.50	1.50	1.50
Detroit, Mich.	.65	.65	.95	.95	.95	.95
Earlestead (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.40	.40	1.00@1.25	1.00		.90
Elkhart Lake, Wis.	.50	.40	.60	.50	.50	.50
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Greenville, Mechanicsburg, O.	.65	.65	.65	.65	.65	.65
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.		.40		.60	.60	
Indianapolis, Ind.	.60	.60		1.50	.75@1.00	.75@1.00
Janesville, Wis.		.65@ .75			.65@ .75	
Libertyville, Ill.		.50		.70		
Mankato, Minn.—Pit run	.50	.40	.40		1.25	
Mason City, Ia.	.65	.55	1.70	1.60	1.55	1.55
Mendota, Ill.	.80	.80@ .95		.80@ .95	.70@ .85	
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	.60	.60	1.20@1.40	1.20@1.40	1.20@1.40	1.20@1.40
Riton, Wis.		.60			.80	
St. Louis, Mo., f.o.b. cars	1.30	1.10	1.50	1.30		1.25
St. Louis, Mo., delivered on job	2.05	2.20	2.35	2.15		2.10
Summit Grove, Clinton, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	1.00	1.00	1.00	1.25	1.00	1.00
Waukesha, Wis.	.50		All other sizes, .70 per ton			
Winona, Minn.	.40	.40	1.25	1.10	1.10	1.10
Yorkville, Sheridan, Moronts, Oregon, Ill.	.60	.50@ .70		.60@ .80	.50@ .70	.60
SOUTHERN:						
Alexandria, La.		.70			1.20@1.35	
Birmingham, Ala.	1.48		all gravel—1.88			
Charleston, W. Va.		1.40				1.50
Estill Springs, Tenn.	1.35	1.15		1.00	.85	.65
Ft. Worth, Tex.		2.00		2.00		2.00
Jackson's Lake, Ala.	.50@ .60	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75	1.00	1.50	1.50	1.50	1.50
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.	1.00	1.00				.80
New Orleans, La.		.50			1.00	
Pine Bluff, Ark.	1.20	.90	Washed gravel, all sizes, 2.25			
Roseland, La.		.25	.85	.85		
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	80	.80
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton. Missouri River, .85)					
Los Angeles, Calif.		1.00		1.50	1.50	
Pueblo, Colo.	1.10*	.90*			1.50	
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.15@1.45
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*		1.00*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch	Sand, ¼ inch	Gravel, ½ inch	Gravel, 1 inch	Gravel, 1½ inch	Gravel, 2 inch
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd.			
Cherokee, Iowa			.80 per ton—1.20 washed			
Dudley, Ky. (Crushed Sand)	1.00	1.00		.90		
East Hartford, Conn.			.65 per cu. yd.			
Estill Springs, Tenn.						.85
Fishers, N. Y.		.50@ .65		.50@ .65		
Grand Rapids, Mich.						.50
Hamilton, Ohio			.45 per cu. yd. in pit			
Hartford, Conn.		1.00*				
Hersey, Mich.				.50	.50	
Indianapolis, Ind.			Mixed gravel for concrete work, .65			
Lindsay, Tex						.55
Janesville, Wis.		.65			.65@ .75	
Pine Bluff, Ark.			Road gravel .50			
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.40			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Tex.		.80		1.50		1.30
Winona, Minn.			Clean pit run .70			
York, Pa.		.95@1.10		(crushed rock sand)		

*Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.00	1.20	1.50	1.20	1.20	1.20	1.20
Easton, Pa.	2.00	.70	1.25	.90	.85	.80	.80
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.			1.25	1.25	1.25	1.25	1.25
Sharpsville and West Middlesex, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.00	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, O.	2.05	1.45	1.75	1.45	1.45	1.45	1.45
Steubenville, O.	2.00	1.40	1.70	1.40	1.40	1.40	1.40
Toledo, O.	1.92	1.67	1.77	1.77	1.77	1.67	1.67
			(Any delivery in city except team track deliveries)				
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.	2.00	1.25	1.50	1.25	1.25	1.25	1.25
Steubenville, Lowellville and Canton, O.	2.00	1.35	1.60	1.35	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.		1.55		1.55	1.55	1.55	1.55
Birmingham, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Ensley, Ala.	2.05	.80	1.25	1.15	1.10	.95	.85
Longdale, Goshen, Glen Wilton & Low Moor, Roanoke, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Burnt Lime Blk.	Ground Burnt Lime Bags	Lump Lime Blk.	Lump Lime Bbl.
EASTERN								
Adams, Mass.			7.00				2.80	
Bellefonte, Pa.			8.00	9.00	8.00		7.00	
Berkley, R. I.			12.00					2.30
Buffalo, N. Y.	10.50	9.00	8.50@11.00	11.00	7.25	9.25	8.00	1.50
Chaumont, N. Y.					2.50	4.00		
Lime Ridge, Pa.							5.00	
West Rutland, Vt.	13.50@14.00	11.00@11.50	11.00@11.50	13.50	10.00		11.00	3.50
West Stockbridge, Mass.								2.25
Williamsport, Pa.			10.00			10.00	6.00	
York, Pa. (dealers' prices)		10.50	10.50	11.50			8.50	1.65*
Zylonite, Mass.	3.20d	2.90d	7.00					
CENTRAL:								
Cold Springs, Ohio	10.50	9.00	8.50		7.25	9.25	8.00	
Delaware, Ohio		9.50	8.50	10.50			8.00	1.50
Gibsonburg, Ohio	10.50	9.00	8.50		7.25	9.25	8.00	
Huntington, Ind.	10.50	9.00	8.50				8.00	1.70*
Luckey, Ohio	10.50	9.00	8.00					
Marblehead, Ohio	10.50	9.00	8.50				8.00	1.50*
Mitchell, Ind.		11.00	11.00	11.00	9.50		8.50	1.45
Sheboygan, Wis.								7.50d
White Rock, Ohio	10.50	9.00	8.50	11.00	7.25	9.25	8.00	1.50
Woodville, O. (dlrs.' price)	10.50a	10.50a	8.00a	10.50a	7.25		8.00	1.60
SOUTHERN:								
Erin, Tenn.							6.00	1.00
Karo, Va.							7.00	1.30
Knoxville, Tenn.	22.00	9.50@11.00	9.50	10.50			7.50	1.30
Ocala and Zuber, Fla.	13.00	13.00	13.00	13.00		12.00	12.00	1.60
Sherwood, Tenn	11.00	9.50			7.50		7.50	
Staunton, Va.					7.00	8.00	7.50b	1.40
WESTERN:								
Colton, Calif.			15.00				19.70	
Kirtland, N. Mex.							15.00	
San Francisco, Calif.	22.00	22.00	15.00	22.00				2.15*
Tehachapi, Calif.							13.00	2.00

‡100-lb. sacks; *180-lb. net, price per barrel; †180-lb. net, non-returnable metal barrel; §Paper sacks. (a) 50-lb. paper bags; terms, 30 days net; 25c per ton or 5c per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl. (d) 280-lb. bbl. net.

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine	2.00
Molding coarse	1.90
Brass molding	2.15
Dresden, O.—Core and traction	1.00
Molding, fine and coarse	1.25
Brass molding	1.50
Dunbar, Pa.—Traction, damp	2.25
Dundee, O.—Glass, core, sand blast, traction	2.50
Molding fine, brass molding (plus 75c for winter loading)	2.00
Molding coarse (plus 75c for winter loading)	1.75
Eau Claire, Wis.—Core	1.00
Sand blast	3.25@3.75
Traction	.30@ .50
Falls Creek, Pa.—Molding, fine and coarse	1.75
Sand blast	2.00
Traction	1.75
Franklin, Pa.—Core	1.25@1.75
Furnace lining	2.50
Molding fine	2.00
Molding coarse	1.75
Brass molding	2.00
Greenville, Ill.—Molding coarse	1.10@1.40
Joliet, Ill.—Milled, dried and screened No. 2 coarse molding sand and open hearth loam and luting clay	.60@ .80
only)	.70
Kansas City, Mo.—Missouri River core	.80
Kasota, Minn.—Molding coarse and	
Klondike, Pacific and Gray Summit, Mo.—Molding fine and core	1.75@2.00
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse, roofing sand, sand blast, stone sawing, traction, brass molding; damp, 2.25; dry	2.75
Massillon, O.—Traction, molding fine and coarse, furnace lining, core	2.75
Michigan City, Ind.—Core, traction	.40@ .45
Mineral Ridge, Ohio—(Green) core	2.00
Furnace lining, molding fine and coarse, roofing, sand blast, stone sawing and traction, brass molding	2.00
Montoursville, Pa.—Core	1.25@1.50
Traction	1.00@1.25
Molding fine	1.50
Molding coarse	1.50@2.00
New Lexington, O.—Molding fine	2.00
Molding coarse	1.50
Oregon, Ill.—Core, furnace lining, roofing sand	1.25@1.75
Sand blast	2.50@3.50
Stone sawing	2.00@3.00
Traction, brass molding	1.25
Ottawa, Ill.—Core, furnace lining, molding fine and coarse (crude silica sand)	1.00@1.25
Ottawa, Minn.—All crude silica sand	.75@1.25
Pelzer, S. C.—Glass sand (carload lots	
Rockwood, Mich.—Core, damp	1.90
Roofing	2.75
Sand blast	3.75
fine, stone sawing (pit run)	1.75

Miscellaneous Sands

(Continued)

Round Top, Md.—Glass sand	1.75@2.00
Core, furnace lining	1.45
Traction	1.60
(All per 2000 lbs.)	
San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@3.50
Direct from pit.	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core	1.75
Furnace lining	1.00
Molding fine and coarse	1.25
Traction	1.75
Utica, Ill.—Core	1.00
Furnace lining	1.00
Molding fine	.75
Roofing coarse	.90
Stone sawing	1.00@2.50
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, O.—Core, furnace lining, molding fine and coarse (damp, 1.75) dry	2.00
Traction, brass molding (dry)	2.00
Zanesville, Ohio—Brass molding and molding fine	1.50@1.75
Molding coarse	1.15@1.40

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Asheville, N. C.—Crude talc	5.00
Ground talc (20-50) mesh), bag extra	7.00
Ground talc (150-200 mesh), bag extra	8.00
Pencils and steel workers' crayons, per gross	1.30@ 2.00
Baltimore, Md.—Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	14.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Crude talc	7.00
Ground talc (150-200 mesh); bags	10.00@12.00
Pencil and steel workers' crayons	1.25@ 3.00
Chester, Vt.—Ground talc (150-200 mesh), bulk	7.50@ 9.00
Emeryville, N. Y.—200-325 mesh; bags	14.00@16.00
Glendale, Calif.—Ground talc (150-200-mesh)	16.00@30.00
(Bags extra)	
Ground talc (50-300 mesh)	13.50@15.50
200 mesh	13.50@14.50
Hailesboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	2.75@ 3.50
Ground talc (20-50 mesh)	5.50@ 7.75
(150-200 mesh) bags	8.25@10.50
Johnson, Vt.—Ground talc (20-50 mesh), bulk 7.50; (150-200 mesh)	8.00@15.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@15.00
(Bags extra)	
Los Angeles, Calif.—Ground talc (200 mesh) (includ. bags)	16.00@20.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk 4.00; bags	5.00
(150-200 mesh); bulk 6.00; bags	7.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@15.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	9.00@14.00
(Bags 1.50 extra)	
Pencils and steel workers' crayons, per gross	1.20@ 2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn—B.P.L. 72% to 75%	6.00@8.50
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 65%-70%	4.00@5.50
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .70 B.P.L. (2000 lbs.)	6.50
Montpelier, Idaho—70% B.P.L.—Crude	4.75
Crushed 2-in. ring and dried	5.00
Paris, Idaho—2,000 lb. mine run, B.P.L. 70%	4.00

(Continued on next page)

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f.o.b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
24x12	$ 9.30	$8.40	$8.10	$7.80
24x14	9.30	8.40	8.10	7.80
22x12	10.80	8.70	8.40	9.10
22x11	10.80	8.70	8.40	9.10
20x12	10.80	8.70	8.40	9.10
20x10	11.70	9.00	8.70	8.40
18x10	11.70	9.00	8.70	8.40
18x 9	11.70	9.00	8.70	8.40
16x10	11.70	8.40	8.40	8.10
16x 9	11.70	8.40	8.40	8.10
16x 8	11.70	8.40	8.40	8.10
18x12	11.10	8.70	8.40	8.10
16x12	11.10	8.70	8.40	8.10
14x10	11.10	8.40	8.10	7.80
14x 8	11.10	8.40	8.10	7.80
14x 7 to 12x6	9.60	8.40	8.10	.....
	Mediums	Mediums	Mediums	Mediums
24x12	$ 8.10	$7.50	$7.20	$5.75
22x11	8.40	7.80	7.50	5.75
Other sizes	8.70	8.10	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.
Granulated slate per net ton f. o. b. quarries, Vermont and New York, 7.50.

(Continued from preceding page)

Ground Rock

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla. — Analysis, 50% to 65% B.P.L.	3.50@6.00
Centerville, Tenn.—B.P.L. 65%	6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72% B.P.L. 65% (90% thru 200 mesh) bulk	5.50
	5.50
Morriston, Fla.—Analysis, 35% B.P.L.	12.00
Mt. Pleasant, Tenn.—B.P.L. 70%	7.00

Florida Soft Phosphate

Raw Land Pebble

	Per Ton
Bartow and Norwills, Fla.—B.P.L. 50%, bulk	6.00@ 8.00
B.P.L. 78%, bulk	13.50
Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

	Per Ton
Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Lakeland, Fla.—B.P.L. 60%	6.00
Morristown, Fla.—26% phos. acid	16.00
Mt. Pleasant, Tenn.—65-70% B.P.L.	5.00@ 6.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Stucco chips, in sacks f.o.b quarries		17.50
Deerfield, Md. — Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	8.00@10.00	12.00@14.00
Slate granules		7.00@8.00
Granville, N. Y. — Red slate granules		7.50
Ingomar, Ohio	12.00@25.00	12.00@25.00
Lincoln, Neb. — Red, white, gray, in bags		30.00
granite; sacks	28.50@30.00	20.00@22.50
Milwaukee, Wis.		20.00@30.00
New York, N. Y.—Red and yellow Verona		32.00
Middlebrook, Mo.—Red		25.00@30.00
Phillipsb'g, N. J.—Green stucco dash		12.00@14.00
Piqua, O.—Marble		7.00@ 9.00
Poultney, Vt. — Roofing granules		7.50
Red Granite, Wis.		7.50
Sioux Falls, S. D.	7.50	7.50
Tuckahoe, N. Y.	12.00	14.00
Whitestone, Ga.—White marble chips, net ton in bulk, f.o.b., bags		
10c extra	5.00	5.00

Concrete Brick

Prices given per 1,000 brick, f. o. b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	20.00	25.00@35.00
Bellows Falls, Vt.	18.00	25.00@35.00
Birmingham, Ala.	13.50	25.00@35.00
Carpenterville, N. J.	20.00	36.00
Easton, Pa.	16.00	40.00@60.00
Eugene, Ore.	25.00@26.00	50.00@75.00
Friesland, Wis.	20.00	33.00
Houston, Tex.		19.50
Lockport, N. Y.	16.00	
Omaha, Neb.	18.00	30.00
Piqua, O.	15.00	25.00
Portland, Ore. (Del'd)	21.00	30.00@60.00
Puyallup, Wash.	18.00	25.00@75.00
Rapid City, S. D.	18.00	25.00@40.00
Rochester, N. Y.	21.00	
St. Paul, Minn.	15.00	30.00@35.00
Salem, Ore.	25.00	35.00@100.00
Salt Lake City, Utah	17.00@18.00	35.00@40.00
Seattle, Wash.	18.00@22.00	35.00@75.00
Springfield, Ill.	18.00	25.00@25.00
Tampa, Fla.	15.00	25.00@65.00
Wauwatosa, Wis.	14.00@15.00	30.00@65.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	7.00
Barton, Wis.	10.00
Boston, Mass.	15.00
Brighton, N. Y.	14.75
Buffalo, N. Y.	16.50
Dayton, Ohio	12.50@13.50
El Paso, Texas	13.00
Grand Rapids, Mich.	12.50
Lancaster, N. Y.	13.50
Michigan City, Ind.	11.00
Milwaukee, Wis.	13.50
Minneapolis, Minn	13.00
Plant City, Fla.	10.00
Portage, Wis.	15.00
Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.50
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
f.o.b. cars	14.00
Washington, D. C.	14.50
Winnipeg, Can.	17.00@25.00

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	19.00	16.00
Baltimore, Md.	15.00	13.00
Boston, Mass.	23.00	20.00
Cincinnati, Ohio	19.60	14.50
Chicago, Ill.	18.00	.....
Dallas, Tex.	25.00	.....
Denver, Colo.	30.00	.....
Detroit, Mich.	15.25	13.25
Fort Dodge, Ia.	19.70	17.00
Grand Rapids, Mich.	15.65	.....
Los Angeles, Calif.	30.00	30.00
Minneapolis, Minn.	29.00	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.	.....	17.25
New York, N. Y.	16.99	.....
St. Louis, Mo.	23.20	20.00
San Francisco, Calif.	22.00	18.00
Seattle, Wash.	27.00	.....

	Lump per 180-lb. Barrel (net) Finishing	Common
Atlanta, Ga.	2.00	1.50
Baltimore, Md.	.....	12.00†
Boston, Mass.	3.35	3.10
Cincinnati, Ohio	.....	12.25
Chicago, Ill.	.....	1.40
Denver, Colo.	.....	2.95
Detroit, Mich.	11.50†	10.50†
Los Angeles, Calif.	3.00*	3.00*
Minneapolis, Minn.	1.70	1.40
New Orleans, La.	.....	1.75
New York, N. Y.	.....	3.69*
St. Louis, Mo.	.....	.70*
San Francisco, Calif.	.....	1.90
Seattle, Wash.	3.25	2.75
Sheboygan, Wis.	.....	10.00

*280-bbl. (net). †Per ton.

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga. (bags)	3.45
Boston, Mass.	2.61
Cedar Rapids, Iowa	2.48
Cincinnati, Ohio	2.59
Cleveland, Ohio	2.46
Chicago, Ill.	2.20
Dallas, Tex.	2.25
Davenport, Iowa	2.43
Denver, Colo.	2.65
Detroit, Mich.	2.48
Duluth, Minn.	2.14
Indianapolis, Ind.	2.31
Kansas City, Mo.	2.30
Los Angeles, Calif.	3.06
Milwaukee, Wis.	2.37
Minneapolis, Minn.	2.39
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.80
New York, N. Y. (includes bags)	2.40
(10c per bbl. discount in 10 days)	
Peoria, Ill.	2.41
Pittsburgh, Pa.	2.24
Portland, Ore.	3.00
St. Louis, Mo.	2.35
San Francisco, Calif.	2.63
St. Paul, Minn.	2.39
Toledo, Ohio	2.53
Seattle, Wash.	2.90

NOTE—Add 40c per bbl. for bags.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco* Calcined Gypsum	Cement‡ and Gauging Plaster	Wood Fiber	White§ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	——Plaster Board—— ½x32x36" Weight 1500 lb. Per M Sq. Ft.	⅜x32x36" Weight 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	.....	.....	6.00	13.00	.....	12.00	.....	.....	.....	14.00	.....	.....	.....
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00	.....	21.30	20.00	20.00	.....	30.00
Garbutt, N. Y.	.....	.....	6.00	8.00	10.00	12.00	.....	.....	.....	14.00	.....	.....	.....
Grand Rapids, Mich.	3.00	.....	6.00	8.00	10.00	10.00	.....	.....	31.25	21.00	19.38	20.00	30.00
Hanover, Mont.	4.50	.....	6.00	10.00	.....	10.50	.....	.....	.....	.....	.....	.....	.....
Mound House, Nev.	.....	8.50	6.50	10.50@11.50	.....	.....	.....	.....	.....	.....	.....	.....	.....
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00	.....	.....	10.00	12.00	12.50	.....	.....	33.75	.....	.....	.....	.....
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00	.....	.....	.....	.....	28.50	.....	35.00

NOTE—Returnable Jute Bags, 15c each, $3.00 per ton; Paper Bags, $1.00 per ton extra.
*Shipment in bulk 25c per ton less; ‡Bond plaster $1.50 per ton additional; +Sanded Wood Fiber $2.50 per ton additional; §White Moulding 50c per ton additional; ||Bulk; (a) Includes sacks.

News of All the Industry

Incorporations

The Oliver Rock Products Co., Los Angeles, Calif., has been incorporated for $10,000.

The Owl Canon Quarry Co., Fort Collins, Colo., has been incorporated for $50,000 by J. Lewandowski and C. E. Roberts.

The Soda and Potash Corp., Denver, Colo., has been incorporated for $250,000 by E. A. Pivan, W. B. King and Everett Trout.

The Bowmantown Sand and Coal Co. has been incorporated for $10,000 by Andrew D. Farrell, R. Godshall and M. Smith, Scranton, Pa.

The Fish and Eddy Sand and Gravel Co., Arverne, N. Y., has been incorporated for $30,000 by J. Fendrick, M. Weiss and H. E. Schwartz.

The Gillies Quarries, Ltd., Winnipeg, Man., have been incorporated at $250,000 by C. L. Gillis, J. Gillis and others to engage in quarrying stone.

The Western Washed Sand and Gravel Co., Milwaukee, Wis., has been incorporated for $25,000 by Frank Schub, Alfred Vick and Alfred Groneymeyer, Milwaukee.

The Pine Creek Lime and Stone Co., with offices at Jersey Shore, Pa., has been incorporated and will quarry and crush stone and manufacture concrete products. The company will also hydrate and grind lime. Incorporators are: A. R. Gilmore, Linden; C. W. Williamson, New Brunswick, N. J.; H. J. Carpenter, Jersey Shore, R. D. 3; Dr. W. N. Shuman, H. B. Rorabaugh and C. E. Peterson, Jersey Shore.

Quarries

The Federal Crushed Stone Co., Pipestone, Minn., is rushing the completion of its plant and is getting ready to begin the crushing of stone. Glenn Wright is manager.

The Pittsburgh Limestone Co., Altoona, Pa., has resumed the operation of its quarries, idle nearly two years. They are feeders to the U. S. Steel Corp. works at Braddock.

The Vigneron Stone Quarries have added a third quarry to its operations at Pauline, Kans., and the work of building bins and working the property has begun. M. B. Vigneron is the owner.

The Tavern Rock Sand Co.'s power plant at Klondyke, Mo., was destroyed by fire from the explosion of an oil-burning furnace, and resulted in damage estimated at $10,000. The plant will be rebuilt immediately.

Sand and Gravel

Tipton, Ind.—Will Jaqua has closed a lease for a gravel pit southwest of the city and will begin the operation of this property at once.

James Fribley, after establishing a suction gravel machine in the Glingle pit, southwest of Bourbon, Ind., has purchased the 20 acres on which the pit is situated. Plans are under way for developing the property.

The Columbus Gravel Co., Columbus, Ind., has received an order for 20,000 cu. yd. or approximately 600 carloads of gravel from the Pennsylvania Railway. With several other large orders booked, the company is now operating on a 24-hour basis.

Lime

Chester J. Pegg, formerly assistant superin-

The Waukesha Lime and Stone Co.'s pulverizing plant was recently destroyed by fire. The

The Charles Warner Co. plants at Cedar Hollow and McCoy, Pa., report the heaviest run in years on lump lime for building purposes.

The Kaweah Lime Products Co., Terminus, Calif., is increasing its plant capacity at a cost of $20,000 to develop its large deposits of lime for agricultural purposes. A. C. Root is manager.

Cement

The Lehigh Portland Cement Co. is to build a million-barrel mill on a tract of 250 acres in East Birmingham, Ala.

The Atlas Cement plant, near Allentown, Pa., announces a general increase in wages for all classes of employes.

The Pittsburgh Plate Glass Co. is planning the erection of a million dollar cement plant at White Cottage, Pa.

The Allentown Portland Cement Co., Evansville, Pa., has increased the wages of its employes 17½ per cent. A 12½ per cent increase was also granted July 1.

Seattle, Wash.—Cement mills in the Puget Sound district are working at nearly full capacity with a total output of 5300 bbl. a day, of which half goes into road construction and half into building construction in this territory.

The Louisville Cement Co. is erecting a new brickment mill at Speeds, Ind., costing $500,000 to replace the old plant recently destroyed by fire. The plant will have a capacity of 2500 bbl. of cement and all machinery will be electrically driven.

Kaying City, China—Plans are under consideration for the construction of a small cement plant near Kaying City, 150 miles inland from Swatow, China. The necessary materials are reported to be found in abundance in this district and the possibilities of a business will be tested out by establishing a small plant, which can be enlarged if circumstances justify.

Manufacturers

The Hercules Powder Co. announces a reduction in its selling prices of high explosives and blasting powder, effective September 18.

The White Co. and the White Motor Co., Cleveland, Ohio, announce the removal of their general offices from 5611 Euclid avenue to the administration building, at the factory, St. Clair avenue and East 79th street.

The Carroll Chain Co.'s new plant at Columbus, Ohio, has completed its first six months in the manufacture of chains. The plant is of latest design and is equipped to manufacture all types of chain, specializing in the fire-weld chain for dredges and steam shovels. Daniel Carroll, one of the organizers of the Columbus Chain Co., in 1900, is the president of the organization, and has devoted an active life to the chain industry. G. G. McAlister, treasurer, is also a veteran in the industry, having been in the business for 17 years. The sales manager and secretary, J. M. White, is also well-known in the field, having formerly been connected with the Johnson Sales Co., Pittsburgh, Pa.

Personal

James L. Medler has been nominated for the presidency of the New York Credit Men's Association. Mr. Medler is assistant treasurer of the Atlas Portland Cement Co.

Louis Feingold, who for the past year has been employed at the Hudson Valley Portland Cement plant in Cementon, has been transferred to the office in New York City.

tendent of the Tidewater Portland Cement Co., Union Bridge, Md., has been put in complete charge as general superintendent.
loss is estimated at $50,000.

Lewis G. Eaton, formerly of Chicago, has accepted a position with the Cebu Portland Cement Co., Cebu, P. I., and is now on his way to the Philippine Islands on board the "President McKinley."

David J. Kelly, formerly assistant superintendent of the sand-rock plant of the Pittsburgh Plate Glass Co., Ford City, Pa., has resigned as superintendent of quarries for the Casparis Stone Co., Connellsville, Pa., and accepted the position as superintendent of the Greer Limestone Co., Greer, W. Va.

T. M. McVey has joined the staff in the Department of Ceramic Engineering, University of Illinois, as an instructor. Mr. McVey was graduated from that university in 1914. From June of that year until April, 1915, he was employed on some special work carried on in the department. Subsequently he was assistant superintendent of the Clinton Paving Brick Co. in Clinton, Ind. Then he went to the Streator Brick Co., Streator, Ill., where he remained over two years and later was connected with the Basic Products Co., Kenova, W. Va. More recently he was with the Lacon Clay and Coal Co., Lacon, Ill., as superintendent of the plant.

Obituary

A. I. Thompson, founder of the A. I. Thompson Stone Co., Bloomington, Ind., died recently of diabetes at the age of 54. He is survived by a widow and two children.

Trade Literature

"Gear Economies Through New Tooth Shapes" is the title of a paper, now reprinted, read before the Central Electric Railway Association by E. S. Sawtelle, assistant general manager of the Tool Steel Gear and Pinion Co., Cincinnati.

Hydrating Process—A recent booklet, entitled "Clyde Lime Hydrator," gotten out by H. Miscamphell, Duluth, Minn., discusses the claims made by the manufacturer for the practical advantages of this hydrator, including a few comparisons made of the continuous method and that of the Clyde batch method. Space is also given to the crushing, hydrating and screening and bagging stages, with descriptions and illustrations.

Contractors' Machinery—Bulletin 1001 of the Climax Engineering Co., Clinton, Iowa, illustrates and describes some typical installations of this company's engines for contractors' machinery. These installations include tractors, engines, standard road and crawler-type cranes, ditchers, industrial locomotives, tractors with hoists, standard power units, both gasoline and kerosene; air compressor sets and special engines made on contract.

Pulverized Coal Systems—The Raymond Brothers Engineering Co., Chicago, has issued a booklet describing the design, installation and operation of its Rayco pulverized coal systems. It offers a complete engineering and manufacturing service for preparing, distributing and burning pulverized coal. Some of the topics treated are fuel economy, essentials to successful results, records, combustion efficiency, variety of applications, plan of typical plants, crushing and drying equipment, burners, tables of capacities, and data sheets. It is illustrated by detail drawings and halftones of installations.

Pneumatic Collecting and Conveying—The B. F. Sturtevant Co., Hyde Park, Boston, Mass., has just issued a new 72-page engineering bulletin on pneumatic collecting and conveying. It contains 32 pages of pictures and diagrams, 17 pages of useful tables—how to find the size of fans, the suction, volume, r.p.m. and horsepower for any system, cubic feet of air handled per minute, size of pipe and ducts used, and various other valuable tables. Data are also given on dust collecting from grinding and polishing machines, tumbling barrels, sand blast machines, coal breakers, shoe machinery and the removal of fumes, gases, etc. In addition, there are parts on the conveying of pulverized coal, fibrous materials, coffee, ashes, wool, wood chips, etc., etc. It is a most comprehensive treatise on pneumatic collecting and conveying systems. A copy will be sent on request.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion

Machinery For Sale

DRYERS—Direct-heat rotary dryers, 3x25′, 3½ x25′, 4x30′, 5½x50′, 6x60′ and 7x60′; double shell dryers, 4x20′, 5x30′ and 6x35′; steam-heated air rotary dryers, 4x30′ and 6x30′.

KILNS—Rotary kilns, 4x40′, 5x50′ and 6x70′, 6x100′, 7x80′ and 8x110′.

MILLS—6x8′, 6x5′, 5x4′, 3x3¼′ pebble and ball mills; 3′ March mill; 42″, 33″ and 24″ Fuller-Lehigh mills; 4½x20′, 5x11′, 5x20′, 5½x22′ and 6x20′ tube mills; 7½x13″, 9x15″, 16x10″ and 12x26″ jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 24″, 36″ and 40″ cage mills; 3′ and 4½′, 6′ and 8′ Hardinge mills; 18x12″, 20x12″ and 30x10″ roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 5 roll and 2 roll No. 1 and No. 000, No. 00 and No. 0 Raymond mills; one No. 3 and No. 4 and No. 7½ Telsmith breaker; one 36″ Sturtevant emery mill; one 3 roll Griffin mill; 60″ chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; 6x8′, 6x5′ and 4x3′ Newaygo vibrating screens; Richardson automatic scales; 8′ and 10′ Emerick air separators.

Air compressors.

W. P. Heineken, Engineer
95 Liberty Street, New York. Tel. Cortland 1841

FOR SALE
Equipment in Excellent Condition

1—Marion 45 ton Steam Shovel, Railroad Type.
4—Steel Ore Dump Cars, Standard Gauge, 100,000 lbs. capacity.
2—Wooden Ore Dump Cars, Standard Gauge, 80,000 lbs. capacity.

These Standard Gauge Dump Cars are ready for main line service. An advantage during present car shortage.

Having installed a hydraulic dredge, we have no further use for this equipment

INTERSTATE SAND & GRAVEL CO.
123 West Madison St., Chicago

FOR RENT AND SALE

20—12-yd. Western air dump cars, std. gauge.
50—60,000-lb. capacity flat and box cars.
1—Western standard gauge spreader, used sixty days.
1—Osgood 18 revolving shovel, traction wheels, No. 794, ¾-yd. bucket, built 1920.
1—Marion 76 steam shovels No. 3503, std. gauge, weight 110 tons, used 10 months.
2—Foote 40-S 1-yd. side discharge concrete mixers, with steam engine and boiler.
32—NEW 20-in. I-beams, 80 lbs. per foot, 40 ft. long, not drilled.
1—NEW Lakewood concrete chuting system.
6—NEW wood-burning locomotive-stacks.

Locomotives

1—50-ton 18x24-in. six-wheel switcher.
1—40-ton 17x24-in. four-wheel switcher.
2—NEW 24-ton six-wheel Porters, separate tender, 36-in. gauge.
2—18, 14 and 10-ton Vulcans, 36-in. gauge.

INDUSTRIAL EQUIPMENT CO.
McCormick Building Chicago, Ill.

FOR SALE

2 8x110′ Rotary Kilns
6 5x6x7x110′ Rotary Kilns
8 5x21′ Tube Mills, Steel Lining
6 250 H.P. Oil City Water Tube Boilers
1 4′ 6″ x 40′ Coal Dryer
1 5′ x 46′ 6″ Rock Dryer
1 No. 5 Gates Crusher
8 Krupp Ball Mills
4 Engines, 200 to 500 H.P.
8 33″ Fuller Mills

Shafting, Pulleys, Bearings and Elevator Equipment, all in first-class operating condition.

50 Acres of Land and Five Buildings, Stone and Steel Construction.
Located at Stockertown, Pa.

ENGINEERING SALES COMPANY, Nashville, Tenn.
OLLIE LAWRENCE, Stockertown, Pa.

FOR SALE

No. 2 Allis-Chalmers Gates Gyratory Crusher.
No. 3 Austin Gyratory Crusher.
No. 6 Austin Gyratory Crusher.
Two American Process type 24x48″ Rotary Dryers.
50′ continuous steel bucket (8″x16″) and chain elevator.
50′ continuous bucket (7″x13″) and belt elevator.
25 H.P. simple side crank Heilman steam engine.
125 H.P. 18″x24″ side crank Atlas steam engine
75 H.P. 13″x16″ side crank Erie City steam engine.
Lidgerwood Standard double cylinder, two drum, 10″x12″ hoisting or cableway engine.
Two 150 H.P. General Electric Co. Induction motors, voltage 440 or 220, shop numbers 625140 and 1164925.
Williams No. 9 Swing hammer, Universal type pulverizer.
Worthington 10″ intake by 8″ discharge by 20 cylinders steam pump.
25 tons of 40 to 60 lb. rails.
7—2 yard, all steel, 48″ gauge end dump quarry cars.
One Sanderson cyclone No. 14 electric, non-traction well drill and equipment.

ADDRESS

E. W. Cooper, Engineer
174 3rd Ave. No., Nashville, Tenn.

FOR SALE— SURPLUS EQUIPMENT TWO STEEL DERRICKS

GUY—Built from special plans. Never used. 7 ton, 105 ft. mast, 90 ft. boom, 16 ft. bull wheel; complete with fittings for clamshell or 2-line work; no guys or cable included. Mast, 3 sections, 35 ft. each. Boom, 3 sections; 2—35 ft., middle section 20 ft. Approximate shipping wt., 24,000 lbs.

Sold F.O.B. Indianapolis

STIFF LEG—Used on one job; first-class condition. No cables included but complete with fittings for clamshell or 2-line work. 7 ton, 70 ft. boom, 35 ft. mast; legs 24 ft. 8 in. Boom in 3 sections; 2—30 ft., middle section 10 ft. Mast in 2 sections, 17 ft. 6 in. each. Legs in 2 sections, approximately 12 ft. 4 in. each. Approximate shipping wt. 20,000 lbs. Sold F.O.B. Indianapolis.

Prices Quoted on Application

ABERTHAW CONSTRUCTION CO.
133 Southampton Street Boston 18, Mass.

1—59-ton standard gauge Baldwin 6-wheel saddle tank switcher.
1—40-ton American 4-wheel saddle tank switcher.
2—50-ton standard gauge Brooks 6-wheel switchers.
1—42-ton standard gauge Shay geared locomotive.
2—18-ton 36″ gauge 4-wheel saddle tanks.
2—23-ton new 36″ gauge Porter 6-wheelers, with tenders.
1—20-ton Industrial Loco. Crane.
1—14-B Bucyrus steam shovel, mounted on traction wheels.

BIRMINGHAM RAIL & LOCOMOTIVE CO.
Birmingham, Ala.

IMMEDIATE DELIVERY

SEND US YOUR STEAM SHOVEL INQUIRIES
66x86 in. TRAYLOR JAW CRUSHER.
No. 18K GATES CRUSHER.
50-75 HP. Single Drum Hoists, 25 Cy. Motors.
40-50 HP. D.D. Hoists, 60 Cy., 220-440 V., 3 Ph.
Nos. 3-5-6-7½ & 8K CRUSHERS.
6 and 12 ton Gasoline Locomotives.
10x12 in. Steam Hoist, 3 Drum.
2—DISC CRUSHERS, 36″ SYMONS.
100 TON 2½ YD. ELEC. SHOVEL.
50 to 5000 ft. Steam, Belt & Elec. Compressors.
JAW and ROLL CRUSHERS.
10-15 & 20 Ton Locomotive Cranes.
13x30 in., 9x14 in. and Other Jaw Crushers.
24x54 McLANAHAN ROLL CRUSHER.
Columbus Portable Conveyor, 25 ft. Eng. Dr.

Send us your inquiries for Steam Engine, Centrifugal Pumps, Quarry & Cont. Equip., Etc.

ROSS POWER EQUIP. CO., Indianapolis, Ind.

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

Used Equipment

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

FOR SALE

One (1) No. 6 McCully Crusher rebuilt by us—price $4000.00, with two (2) extra Master Wheels and one extra Shaft and Head. Subject to inspection in our shop and to prior sale.

R. S. NEWBOLD & SON CO.
Norristown, Pa.

WANTED

One 11x16 saddle tank, 36" gauge, used Porter locomotive, for immediate delivery. Must be in good condition, and subject to inspection.

BLAIR LIMESTONE COMPANY
Martinsburg, W. Va.

QUARRY EQUIPMENT

4—20 yd. Steel Underframe Side Dump Cars.
3—16 yd. Steel Underframe Western Dump Cars.
10—1½ yd. Western Dump Cars.
2—10x16 Davenport 36 in. ga. Saddle Tanks.
1—11x16 American 36 in. ga. Saddle Tank.
1—9x14 Porter 4 ft. 8½ in. ga. Saddle Tank.
1—⅝ yd. Thew "O" Traction Shovel.

Walter A. Zelnicker Supply Co., St. Louis

FOR SALE

Monarch Corliss Engine, Rolling Mill Type. Cylinders 20"x42". Diameter Flywheel 14 ft. Built for 78 R.P.M. Engine is in good condition.

JACKSON & CHURCH CO.
Saginaw, W. S., Mich.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building **Pittsburgh, Pa.**

FOR SALE

24" Symons Disc Crusher, never been used.

Breen Stone & Marble Co.
Kasota, Minnesota

Classified Advertising

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid for in advance of insertion.

FOR SALE

92 acres of the purest high calcium limestone in the United States. Located at St. Genevieve, Mo., and adjacent to the Missouri-Illinois R. R. A splendid opportunity for a lime manufacturer that wishes to locate in this locality. Lime from this vicinity has a national demand and a modern lime plant would pay for itself in two years. Address

Mr. J. E. Schuerman
The St. Louis Steel Erection Co.
Syndicate Trust Bldg.
St. Louis, Mo.

WANTED

Electrician experienced with electrical machinery and equipment used in cement mills. Permanent Foremanship open to right man. Reply, giving age, experience, and salary desired. Address

Box 1586, Care of Rock Products
542 South Dearborn Street **Chicago, Ill.**

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who will keep it going.

HIGH GRADE EXECUTIVE

of long experience desires connection with progressive company. Thoroughly familiar with all details connected with extensive production of crushed stone. Expert in modern quarry practice and in plant installation and maintenance. Would consider investment with small company, provided location and future prospects reasonably favorable. Address

Box 1587, Care of Rock Products
542 South Dearborn Street, Chicago, Ill.

George Borrowman, Ph.D.
CHEMIST

Analyses, consultations, researches in connection with rock products, cements, clays, lime, plasters, zeolites, sands, etc.

9 So. Clinton St. **Chicago, Ill.**

H. E. WIEDEMANN
(Est. 1905)
Consulting and Analytical Chemist
Specialist in Analysis of Rock Products
Chemical Bldg. **St. Louis**

Have you a plant for sale? Do you wish to purchase a plant? Are you in need of a superintendent or manager? Are you looking for a position as plant superintendent or manager? Advertise your wants in these columns for quick results.

THE 20-B "BULLSEYE"

Especially adapted for work in gravel pits, light quarry service, etc.; 35 ft. boom, ¾ yd. bucket. Convertible for steam shovel, clamshell, crane, etc., service.

Send for Bulletin C-201 P

BUCYRUS

BUCYRUS COMPANY, SO. MILWAUKEE, WIS.

444

"We now own 3 ERIES—in fact, we have specialized on the reliable ERIE. We find that the mere fact of owning ERIE Shovels brings business, as people know we can do what we say."—*F. P. Behm, Rundle & Behm, Reading, Pa.*

RELIABLE in hard ROCK WORK

WHEN you are selecting a steam shovel, you can make absolutely sure that you buy a reliable machine. Inquire of men who have used different steam shovels in ***severe rock work.*** Find out which shovel has given steadiest service in granite, trap, limestone and flint.

You will surely select the one make of shovel that is noted among quarrymen for "Steadiest service; Fewest repairs."

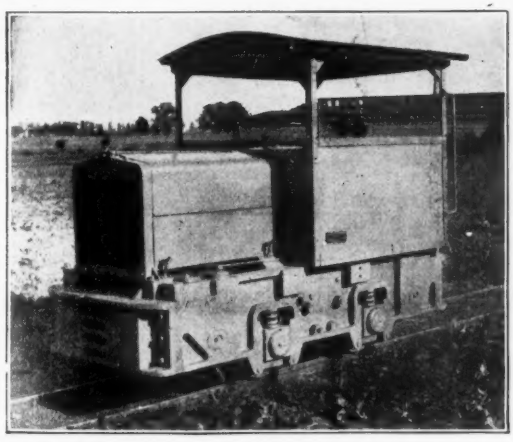
We will be glad to send you our Bulletin, "Loading Rock with the ERIE Shovel"—photos and cost data. It shows just what the ERIE can do in rock work. Write for Bulletin P-36.

ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.

Builders of ERIE Steam Shovels and Locomotive Cranes

ERIE Revolving Shovels

WHITCOMB LOCOMOTIVES



QUARRIES—CEMENT PLANTS—BRICK PLANTS

The success of Whitcomb locomotives in hundreds of plants speaks of their thoroughness of design and construction and dependability in time of need. We would be glad to tell you what they are doing for others.

Whitcomb locomotives are designed to work and built to overwork

WRITE TODAY FOR BULLETINS

GEO. D. WHITCOMB COMPANY

Rochelle, Ill., U. S. A.

AMERICAN GASOLINE LOCOMOTIVE

An Ideal Machine to Produce Continuous Haulage at Minimum Cost

If you have haulage work to do, let the Gas-O-Motive do it. The engine is so simple in construction, so ruggedly built, that it can go through the severest service—service that would put other apparatus out of commission—and come out ready for the next job. "Gas-O-Motives" rarely visit the repair shop.

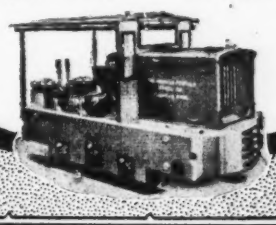
If you have a haulage problem send us your name and address.

"Over a 2,000 foot grade, ranging from 5 to 7 percent, the American Gasoline Locomotive hauls two cars of 2½ yard capacity each, and does it constantly. It works perfectly." Okmulgee Brick Co., Okmulgee, Okla.

THE HADFIELD-PENFIELD STEEL CO.

George G. Stein, Mgr. Gasoline Locomotive Sales Dept.

404 Hippodrome Bldg. CLEVELAND, OHIO



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Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., The, Chicago, Ill.

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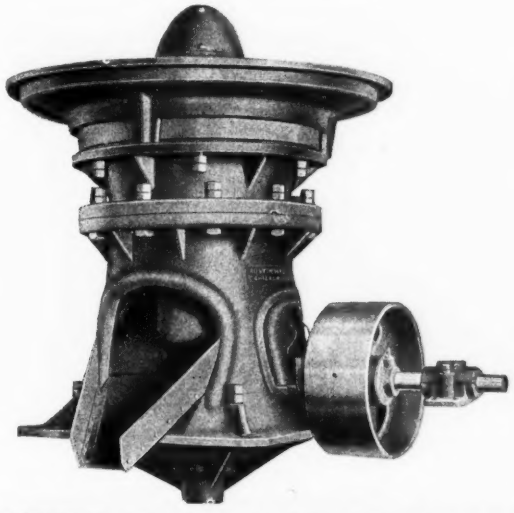
A Crusher is No Better Than its Lubricating System

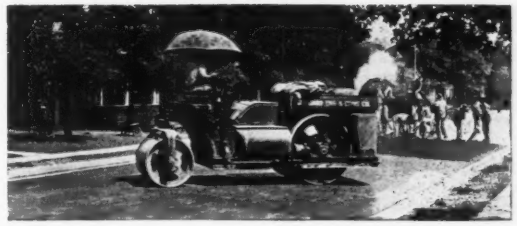
Nothing contributes more to the success of the Austin Gyratory Crusher than its force feed circulating oiling system.

The bottom plate of the crusher serves as an oil reservoir. From this reservoir oil pipes connect with a pump located in the wall of the main frame. The piston of the pump is attached by a connecting rod to the lower dust collar encircling the main shaft. The moment the crusher is started, the movement of the main shaft is transmitted to the pump piston and oil begins to flow in a positively driven stream into the eccentric bearing, flooding it with live oil. The gears are partially immersed in oil and are perfectly lubricated. The counter shaft bearings draw oil from chambers supplied by the oil thrown from the drive pinion onto the pinion hood. Supplementary lubrication can be supplied by additional oil reservoirs on the bearing caps.

The lubricating system is but one of several exclusive features which place the Austin Gyratory Crusher in a class by itself. Catalog 29T, just off the press, illustrates and describes them in detail. Write for your copy today.



AUSTIN MANUFACTURING CO.
New York Chicago San Francisco



Hours Have 60 Minutes Once More

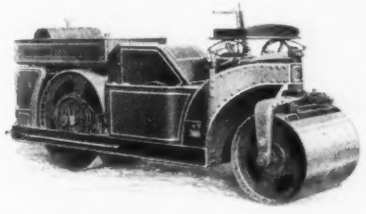
with an Austin Tandem Motor Roller on the job

All steam tandems are "off duty" at least 15 minutes out of every working hour in the day. The engineer spends that much time fussing with his fire and water.

Add to this item the time spent getting up steam and banking fires, and it isn't hard to understand why Austin Tandems have made operating records that no steam tandem can touch.

The motor tandem shines especially brightly on patch work, as it can be started and stopped at a moment's notice and is "off expense" entirely when idle.

Other features of real value, such as ease of handling and low center of gravity, which result in more and better work, are fully described in the latest Austin Roller Catalog FT. Write for a copy.



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Branches in 22 Cities
"Everything from a Drag Scraper to a Road Roller"

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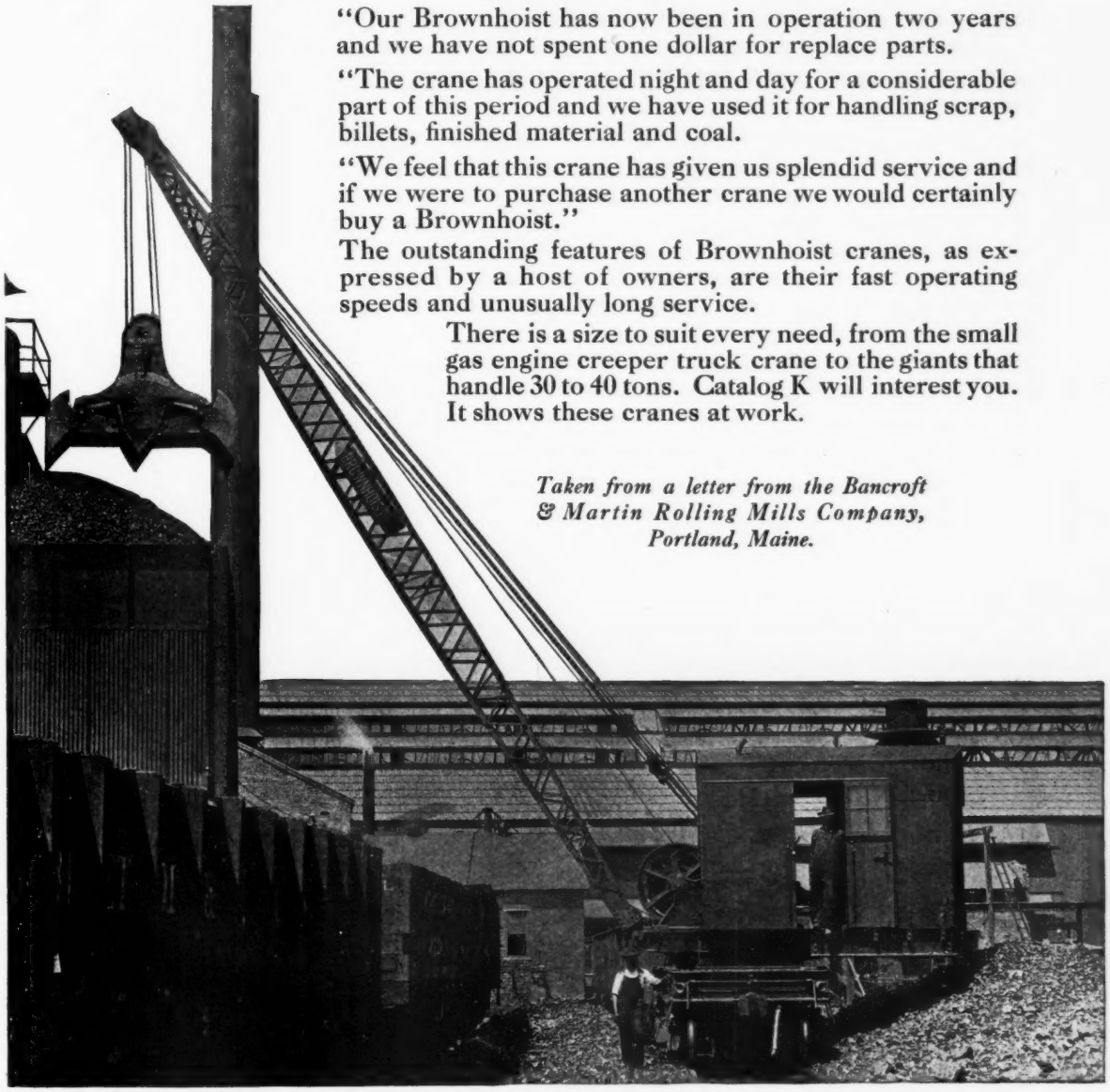
"Crane in operation two years—Not a dollar for replace parts."



"Our Brownhoist has now been in operation two years and we have not spent one dollar for replace parts.

"The crane has operated night and day for a considerable part of this period and we have used it for handling scrap, billets, finished material and coal.

"We feel that this crane has given us splendid service and if we were to purchase another crane we would certainly buy a Brownhoist."

The outstanding features of Brownhoist cranes, as expressed by a host of owners, are their fast operating speeds and unusually long service.

There is a size to suit every need, from the small gas engine creeper truck crane to the giants that handle 30 to 40 tons. Catalog K will interest you. It shows these cranes at work.

Taken from a letter from the Bancroft & Martin Rolling Mills Company, Portland, Maine.

The Brown Hoisting Machinery Co., *Cleveland, O.*

Branch Offices: New York, Chicago, Pittsburgh, San Francisco, New Orleans

BROWNHOIST

MATERIAL HANDLING EQUIPMENT